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THE
SUGAR CANE :

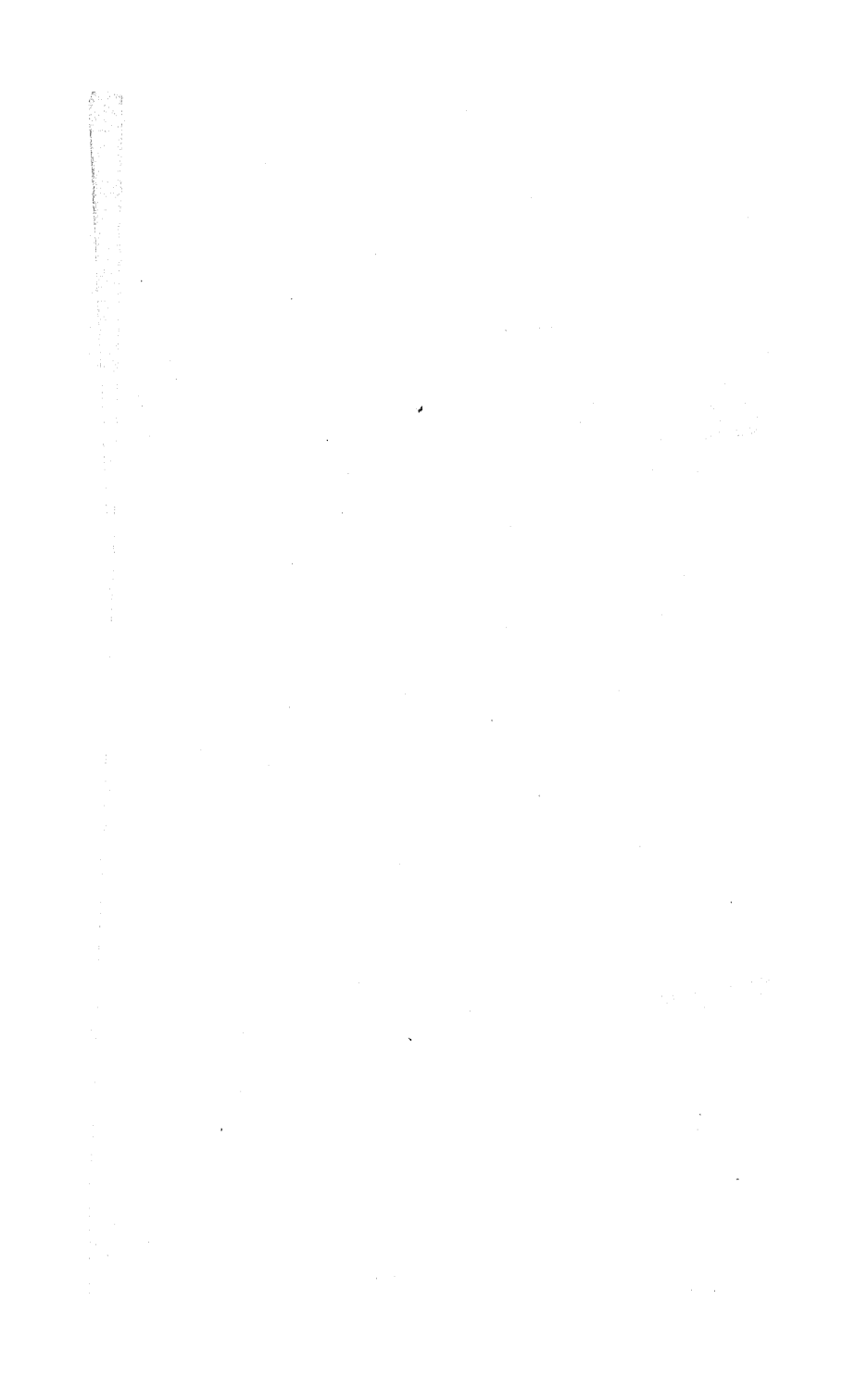
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JANUARY TO DECEMBER, 1885.

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For Scale of Charges for Advertisements, see page xi.

For Table of Contents, see opposite the last page of each Number.

In the October *Sugar Cane*, page 505, we stated, upon the authority of the *Tropical Planter* (Brisbane), that the complete plant of the "Pioneer Mill," of Messrs. Drysdale Brothers, was furnished by Messrs. W. & A. McOnie, of Glasgow. We are requested to state that the plant in question was supplied by Messrs. A. & W. Smith, of that city, and not by Messrs. W. & A. McOnie.

The *Times* Philadelphia correspondent telegraphs December 28—

The Secretary of State writes to the Foreign Committee of the Senate a letter defending the Spanish and West Indian Reciprocity Treaty, and pointing out that satisfactory reports have been received at Washington that Spain will accept the necessary modifications. The probability of the rejection of the Treaty is unchanged.

We have pleasure in calling the attention of those of our readers, who may not already have seen it, to an excellent pamphlet, recently issued by Mr. T. Neill, of Greenock, on "The Sugar Bounties," a lengthy notice of which we give at page 32. So much has been said upon this question that our readers will be disposed to query what more can be said? We venture to think that even those who think they know all about it will find something here they did not know before. We understand the pamphlet is not for sale—but we have no doubt Mr. Neill will supply copies to those who are honestly desirous of knowing the true facts of the case.

Messrs. Todd, Hildalgo & Co., of Havana, have published some interesting statistics, "compiled from the most reliable private sources," of the production of sugar in Cuba for the past 12 years. In only one of these years (1873) has the total exceeded 700,000 tons. In four of them (1874, 1875, 1879, and 1882) the total exceeded 600,000 tons. In five of them (1876, 1877, 1878, 1880, and 1884) over 500,000 tons; and in two of them (1881 and 1883) the total fell below 500,000 tons. See pages 38 and 39.

The length of the proposed Nicaragua Canal, from the Pacific to the Atlantic, is $173\frac{1}{2}$ miles, that is to say, $17\frac{1}{4}$ miles from the Pacific at Breto Harbour to the Lake of Nicaragua, $56\frac{1}{2}$ miles of lake navigation, 70 miles along the river San Juan, and 36 miles from the river to Grey Town, where it enters the Atlantic. The cost is computed as over £8,000,000.

Some excitement has been created in San Francisco by the shooting of Mr. Michael De Young, the editor and proprietor of the *San Francisco Chronicle*, by Mr. Adolph Spreckels, a son of Claus Spreckels, on the 19th of November last, at the office of the *Chronicle*, and was, it is stated, "the outcome of an article lately published in the *Chronicle* respecting the affairs of the Hawaiian Commercial Sugar Company." Spreckels fired a pistol three times at the unfortunate editor, who, by latest accounts, was still alive, but in a serious condition.

We received from Mr. Remmers, but too late to be noticed last month, samples of sugar solutions of Low Jaggery, Low Java, and Beet, treated with 10 per cent. brown coal, and the same treated with charcoal, also samples of the raw sugars used; clearly showing the greater power, as a decolourising agent, of brown coal over charcoal. At page 22 will be found a letter from Mr. Remmers on the same subject, accompanied with reports of analyses made by Mr. Wallace, Messrs. McGowan and Biggart, and Mr. E. M. Dixon. At page 30, we insert a letter from Mr. Casamajor, in which he says, "Brown Coal has certainly a greater decolourising effect than I had stated;" he cannot give

an opinion as to the value of brown coal as a decolouriser, as this depends entirely on the price at which a refiner can actually buy it.

According to a table published by the *South American Journal and Brazil and River Plate Mail*, the total value of the exports from South America to the United Kingdom in 1883 was £19,081,747, of which those from Brazil amounted to £6,482,144, or over one-third. Chilian exports, which stand next in value, amounted to £3,436,580, or little more than half as much as Brazil. Those from Peru stand third, £2,684,854; fourth, those from British Guiana, £2,404,334; fifth, those from the Argentine Republic, £1,234,449; sixth, those from the United States of Columbia, £1,120,370; seventh, Uruguayan, £836,819; eighth, Bolivian, £378,877; ninth, Venezuelan, £263,027; tenth, Ecuadorian, £227,630; eleventh, Dutch Guianan, £115,081; and twelfth, Falkland Islands, £97,782.

The sweetening power of sugar made from cane, as compared with that made from beetroot, is a question upon which different opinions exist. Some say that it takes $1\frac{1}{2}$ lbs. of beet sugar to produce the sweetness obtained from 1 lb. of pure cane sugar. Others, that it takes $1\frac{1}{4}$ lbs. of beet to equal 1 lb. of cane. Which ever it is, the difference is an important one, and one which our West India Committee would do well to have put to a practical test—say by inducing one of our large institutions, such as Eton, Harrow, or Rugby, where sugar is used *ad libitum*, to use cane sugar for three months and then three months of beet. If the result in the consumption supported the opinions above mentioned, to have it published in all our papers, and a copy sent to every grocer throughout the three kingdoms. If this could be done, and the difference between cane and beet sugar here stated, be clearly demonstrated, it would do more to bring about a healthy public opinion in favour of our own cane grown sugars than all the deputations to Lord Granville, Lord Derby, and all the Anti-Bounty public meetings put together.

A planter in Antigua, to whom was sent a copy of the July *Sugar Cane*, giving some particulars (page 570) of the yield of sugar per acre obtained in the Hawaiian Islands, writes :—

“I cannot but say that when cultivation was carried on in this island (Antigua) under the then system (say 20 or 24 years ago) and regard was had to the nature of the cane plant A L, when the old vertical windmills were in use, and the copper put in by the old masons, who had been slaves on the estates, we then obtained, in many instances, four hogsheads of sugar per acre, weighing over 2,000lbs. on an average of what was then termed good grocery sugar, and some estates taking not more than 1,000 gallons to the hogshead. From what I read, and what I heard from several planters of the neighbouring islands, I conceive there is no land in the islands or elsewhere more adapted to yield greater results than the lands of this island if properly cultivated, and the sugar manufactured in a rational manner. If this could be done under the old (Noah's) state of things, what may not be done under a scientific state of things, as we see every day displayed elsewhere. To go into the many evils prevailing would take up a volume, and it is heartrending for a planter of 40 years' standing, and who has filled every department in agriculture, in mechanical manufactory, and other incidental departments in connection with planting interests, to see matters carried on in the out-of-order manner which now exists. Instead of improving we have retrograded fearfully. I feel assured, if it is possible to have things done in a rational manner that even if sugars could be sold in the island at 12s. or 13s. per cwt. estates could be made to pay well, and as far as I can judge, the time is not far off when sugar will bring much higher prices.”

STAMPS UNDER THE PATENTS ACT.—The Revenue Act, 1884 (47 and 48 Vict. c. 62), s. 9, contains a very proper measure of relief with regard to applications for patents. By virtue of the Patents, Designs, and Trade Marks Act, 1883 (46 and 47 Vict. c. 57), ss. 5, 24, and the schedules, an application for a patent was to be made in the form set out in the schedule, accompanied by a statutory declaration, and a fee of £1 was to be paid, and the example given in the schedule distinctly shows that a £1 stamp was required. Yet, as by the Stamp Act, 1870, a half-crown stamp is required on every statutory declaration, it would seem that this stamp also should have been affixed. Now, however, it is declared that such an application for a patent “shall be deemed to have been and shall be exempt from the stamp duty of 2s. 6d. charged on a statutory declaration.” We have little doubt that many persons must have been misled by the form in the Patents Act, and think this was a very proper case for retrospective legislation, much as we object in general to the too common mode of proceeding.—*Law Times*.

1884.

The year which has just closed has been a most disastrous one to nearly every one—except retailers and consumers—interested in sugar. In no one year in the history of the trade have the losses all round been so enormous. The price of sugar at the commencement of the year was so low, that it was the opinion of many shrewd men in the trade that the bottom had been touched. Instead of this proving to be the case, the fall in values continued steadily, month by month, with scarcely a break, all through the year, until the price of beet 88% which in January stood at 17s. 6d., fell to 10s., a difference of 42½% in the 12 months; and this too, in the face of an increase in the world's consumption, which is without a parallel.

The cause of this serious fall in price is obvious;—over-production, brought about by the system of bounties, adopted by Germany and some of the other beet-growing countries, on their export of sugar. As we showed in the October *Sugar Cane*, page 546, the average bounty given by the German Government for the campaign 1883-84, was 2s. 8d. per cwt., and the line of argument adopted by the Board of Trade, is, that the bounty being only 2s. 8d., whilst the fall in value is 7s. 6d., the difference—4s. 10d. per cwt.—is due to the natural fluctuations of the market; apparently ignoring the fact that it is this bounty of 2s. 8d. per cwt. which has led to this excessive production, and is the cause of our present troubles.

If evidence were required to prove this, we have only to turn to France. In 1868-69 the French crop amounted for these two years to 503,000 tons. In 1875-76, when the bounties were in full force, the production rose to 913,000 tons. In the year following, measures were taken by the French Government which practically removed the bounties on production; from that time the crop has shown no increase, and the production of sugar has become so unprofitable, that the Government have been forced to pass a law, under which it is anticipated that a larger bounty, will, in future, be obtained by the French growers, than by those of any other country in Europe.

This ought to be a conclusive answer to those who assert, on the one hand, that the fall in the price of sugar is not due wholly to the bounties, and, on the other, that if the bounty growing countries are left alone, the loss to the revenue will become so serious that they will, before long, be compelled to abolish the system.

The natural remedy for this, is the imposition of a countervailing duty. To countervail, is "to act against with equal force or power," to equal, to balance. A countervailing duty would simply be placing sugars upon a natural basis; and this is all that our sugar colonies ask should be done. If, all being equal, it is found that they cannot compete, they will accept the situation, and turn their estates to the cultivation of something else. Reasonable as this remedy is, and quite consistent with the principles of Free Trade, still the idea that a countervailing duty is only another name for Protection, has got hold of the public mind, who associate it with the mischievous Fair Trade movement, so that no Government, either Tory or Radical, would venture to adopt it. We must therefore, dismiss from our minds this mode of meeting the evil.

This being the case, we think Mr. Baden-Powell's proposal of calling a conference of the different beet-growing countries, with a view to put an end to the present "war of bounties," as set forth in his article, "A Last Word on the Bounty Question," reprinted in our last number, is the only one likely to effect the object.

Negotiations have recently been entered into between the United States and Spain, for a reciprocity treaty for Cuba and Porto Rico. The details are to be submitted to Congress at an early date. It is said to be the most complete reciprocity treaty ever negotiated by the United States Government, embracing not only the exchange of products, but also special shipping privileges for the vessels of the two nations, abolishing all tonnage and consular fees on vessels and cargoes, and making all other fees the same as for the national vessels engaged in the coasting trade. It also contains special privileges for commercial travellers, reforms in the Cuban customs regulations, concerning fines and the responsibility of vessels for errors, when fraud has not been

proved, and a stipulation against the imposition of new import taxes. If this proposed treaty is carried into effect, which we think very doubtful, it means that one-half of the sugar now consumed in the States will be admitted duty free. Naturally we might conclude that this would be a boon to the consumer of sugar. Will it, however, prove so? Judging from the working of the Hawaiian Treaty, we doubt if the consumer is benefited one cent, notwithstanding the duty to be remitted would amount to something like £5,000,000. It is just the sort of "big thing" for such millionaires as Vanderbilt to handle and "control," and the plunder being shared in between them and the planters; they looking well to it that they secure the lion's portion. Then there is the matter of drawbacks; how is the distinction to be made between those sugars which have paid duty, and those admitted duty free? Would not this open a very wide door for frauds on an extensive scale?

What would permanently benefit the West Indies, would be, a reduction of the duties, say to one-half, if the time has not arrived for their entire abolition. This would lead to a still further increase in the consumption in the States, and, as a consequence, in time, to a decided improvement in prices.

The severe crisis through which our West India colonies are passing, has led to a considerable correspondence in our daily and other papers, as to its causes, and the remedies to be applied. Our planters have been twitted for their want of skill and energy in the cultivation of the cane, and in the manufacture of their sugar, and in this respect showing the striking contrast between them and their German rivals. We are far from saying that our planters have made the most of their opportunities, but in instituting contrasts, to be fair, every circumstance should be brought into the reckoning. Their German rivals have given them the most powerful incentive to put forth their utmost energies, for every decimal percentage of sugar obtained beyond the legal yield, is a clear gain to them, to the extent of the duty. Our own planters have no such incentive, but, on the other hand, have been struggling on, handicapped by these bounties.

The British Refiners' Committee have been, during the year, in frequent correspondence with the Board of Trade and the Foreign Office on the question of Foreign bounties, more especially those of Holland and the United States. Mr. Duncan, as chairman of the committee, in his letter to Mr. Giffen, of 29th April, referring to Holland, concludes as follows:—"And now that my statements "have been fully verified, in every respect, I cannot refrain from "expressing my regret that the accuracy of my statements was "disputed, and my warning disregarded, more especially as the "competition of Dutch loaf sugar, at prices below the cost of "production, has continued to increase, and has been most harassing "to producers in this country."

The Refiners' Committee also pointed out to our Government, and, through it, to the authorities at Washington, that if the provisional arrangements in respect to drawbacks under the New Tariff became established, the American refiners would get a bounty on exportation of 2s. per cwt. Unfortunately for the refining interest of this country, these representations were unheeded; the consequence has been that during the first 11 months of 1884, more than 50,000 tons of refined sugar have been exported to this country, upon which the American refiner has received a bounty of upwards of £100,000—that is to say, the American Government have paid back in the shape of drawbacks, £100,000 more than they have received in duties upon the sugars so shipped.

Mr. Giffen, in his summary of the report to the Board of Trade, points out, in order to show that the refining trade of this country cannot be an unprofitable one, that the present production of refined is as great as ever it was. It is well known that the cotton trade of Lancashire at the present time, is in a bad way, and yet the quantity of yarn and cloth now being turned out shows no diminution. Are we to infer from this that there is no real foundation for the complaints which we hear on all sides? The cotton spinner, like the refiner, has heavy standing expenses which have to be met, whether the place is standing or working; and the question has sometimes to be decided, which is the less loss, to work? or to stand? Mr. Giffen would have the public to infer

that because our refiners do not, one after another, close their works, that there is no ground for their grievance.

In entering upon a new year it is very natural for the mind to speculate upon the probable course of events. As regards sugar, at the present time, this is almost as impossible to do as for a captain when leaving Sandy Hook to tell when his ship will arrive in Liverpool. At the same time, there are indications which may fairly furnish good ground for a more hopeful feeling. At a recent meeting at Halle, of German beet-growers and fabricants, it was unanimously decided to reduce the production by 20 per cent., as the only way by which such an improvement in prices could be brought about as would enable the fabricant to give to the beet grower a price that would pay him to go on cultivating. If this is done, it means a reduction, in the next campaign, in the German production of sugar of 200,000 tons, and if we take into consideration the increase that is going on in the consumption, a decided advance in value may fairly be looked for. One thing is very certain, that sugar cannot be grown and delivered in this market at anything like 10s. per cwt. It cannot be done in Germany, even with the bounty of 2s. 8d. per cwt., much less in our own colonies, with no bounties to help them out.

THE SANTIAGO (ARGENTINE) ESTATE AND SUGAR FACTORIES.

A company has recently been registered for taking over these estates. Objects: To purchase the estate known as the Contreras Estate, near Santiago, and the lands, sugar factory, sugar plantations, and carry on the business of sugar cane planters and growers. Capital: £300,000, in £10 shares. Signatories (with one share each): W. Barkey, Grove Park, Chiswick; J. S. Rivolta, 33, Cornhill; A. Challoner, 34, Alfred Place, Bedford Square; J. Jervis, 68, Cheapside; J. G. B. Elliot, 103, Forrest Road, Dalston; W. Best, 2, St. George's Terrace; W. W. P. Burgess, 13, Newton Road, Bayswater. Number of directors to be not less than three nor more than seven. Qualification: the holding of stock of the value of £250. Remuneration: £1200 per annum.

The Contreras Sugar Factories and Sugar-growing Estates are situated about four miles from Santiago-del-Estero, between that town and the property of the Argentine Sugar Estates and Factories, consisting of about 2400 acres, of which 1250 acres are already under cane cultivation. The plant and machinery are spoken of as the best of their kind. Besides the factories, there is a distillery and manager's house, workshops, and buildings; and for working the estate, 45 strong carts, about 100 oxen, 50 horses, and 250 mules.

Don Pedro St. Germes, one of the vendors, states the net profit for the year 1883-84 at £48,958, and guarantees a net revenue for 1885 of £50,000.

THE SUGAR BOUNTY MOVEMENT AND THE FAIR TRADE QUESTION.

It is to be hoped that the opponents of the foreign bounty system will during the rapidly approaching electioneering campaign do their utmost to keep the anti-bounty movement clear of the "Fair Trade" question. An attitude of perfect neutrality towards "Fair Trade" is quite compatible with a vigorous crusade against Bismarck's Sugar Bounties. The issues raised by the Fair Trade party are very wide and very complicated. As yet no definite legislative form can be given to them, whilst the opponents of foreign bounties have reduced their requirements to a legislative basis in the Sugar Bounty Bill propounded by the National Anti-Bounty League.* Within the four corners of this Bill lies the only solution for the foreign bounty question. Both "Free Trader" and "Fair Trader" have a common interest in opposing foreign export bounties by countervailing duties. Such duties, as we have again and again demonstrated, in no wise violate the doctrines of free trade: they would not be incident upon sugar, but upon the export bounties annexed to the sugar. Sugar free of bounties would enter free of duty. The market price of all sugar would range to that at which the duty-free sugar was sold. The exporter of bounty-aided beetroot sugar could neither charge our consumer with the duty, nor would such exporter pay the duty out of his own pocket: his State would pay it for him so long as it continued the bounty, and when it ceased to do so then no duty would be enforced against him by our State. Our consumers would lose the precarious benefits of the bounties, but gain the full advantages of free competition between the whole world on the sugar market of this country. On these grounds alone ample justification exists for every Free Trader voting for countervailing duties. As regards Fair Traders, we assume as valid their objection to the hostile tariffs which impose limitations on the free access of British goods to foreign markets. Free Traders equally object to such hostile tariffs. Both alike know that these tariffs are often the means of enabling an excess production to be sold for export at

* See May, 1884, *Sugar Cane*, page 231.

an undervalue. But the Free Trader differs from the Fair Trader as to the means available for a successful attempt to break down hostile tariffs. One method alone exists, and that is out of question : viz., to give an export bounty equivalent to a foreign import duty. If, then, no agreed method effectual to the end in view exists as to hostile tariffs, practical commerce must acquiesce in foreign States determining their own fiscal regulations for the entry of our goods into their markets. But the Free Trade limits of our non-intervention are foreign import duties. We have said that the foreign tariff enables a surplus to be exported at an under value. To that extent our sugar industry in the colonies and its subsidiary industries at home of refining, sugar machinery manufacture, artificial manure manufacture, &c., suffer in common with many other British industries. But to this disadvantage common to various industries, created by one and the same cause, remediable by no available method, must be added the further disadvantage falling specifically upon our sugar industry of the export bounty system. It is necessary to make this point perfectly clear in order that the sugar bounty question may, without cause of offence to the Fair Trade party, be distinguished from their question. Let us assume for the sake of illustration that foreign hostile tariffs enable sugar and other articles to be sold for export at an undervalue of say x per cent. Let us further assume that an export bounty also enables the article thus aided to be sold for export at an undervalue of say y per cent. Then sugar can on this hypothesis be sold by the double effect of hostile tariff and export bounty at an undervalue of $x + y$ per cent. Surely it is open to practical commerce to deal with one cause of under value capable of practical mitigation, and leave the other cause, not capable of practical mitigation, alone? And yet we have heard some prominent Fair Traders making unfair observations about the exclusiveness and even selfishness of the Anti-Bounty League in refusing to be associated with objects outside its own particular scope of action. We think, however, that the League is fully justified in thus confining itself to that specific form of foreign protection which operates on our home markets by export bounties.

But both Free Trader and Fair Trader must perceive that export bounties are necessarily calculated to maintain a hostile tariff. Export protection is the complement of Import protection: the latter without the former has but limited operation. Without an export bounty any surplus quantity of foreign manufactures must have some limit to their sale for export at an undervalue. But with an export bounty there is no limit of undervalue until the stimulated over-production has caused such a fall in price as to disorganise both home and foreign industries. Then the bounty must be increased, or all is over for the poor State nursling of an industry that cannot live in the rough waters of free competition. Such is the present condition of the continental beet sugar industry. Its bounties have well nigh proved, and will ultimately prove, its ruin. Now is the time for passing an Act giving power to the Crown by Order in Council to levy a countervailing duty (not returnable on export) on all sugar exported under bounty. We should then either see export bounties abolished in the cessation of the drawback system by refining and manufacture in bond, or better still by the freedom of sugar from all taxation. As regards the American bounties, which more than bridge the Atlantic for the American refineries—now springing up so rapidly—it is to be hoped that the latter of these two alternatives will speedily come to pass. But our hopes for the suppression of the American and European bounties are necessarily dependent upon the passing of the Act alluded to, otherwise the United States Government may, as did the French Government, positively refuse to stop export bounties, whilst other countries are allowed to operate with them, unchecked by countervailing duties, on the markets of this country.

Is it too much to hope that even at this the eleventh hour the Board of Trade may discard the spurious political economy of some of its officials and the fictitious interests of the jam and sugar plum makers—for whose sakes recent Board of Trade manifestoes suggest that foreign bounties ought not to be interfered with—and facilitate the necessary legislation for restoring to the British sugar market “free trade and no protection”?—all in fact that

NOTES ON THE WORKING OF A SUGAR REFINERY.

By G. STADE, Hanover (Germany).

In view of the fact that great freedom has been shown by manufacturers of raw sugar in communicating the results of their operations, it would be desirable to have, now and then, a few data from refineries, which would enable us to get some insight into the process of manufacture. This is perhaps scarcely possible in the way that it has been done by manufacturers who work up raw materials; at any rate, it is difficult in the case of the methods which are at present in almost universal use in Germany. Still it would be possible to give figures which would afford a rough basis of comparison. It is the fault of refiners themselves that hitherto reports of their operations on an extended scale have been of very unfrequent and, indeed, almost sporadic occurrence in our remarkably rich specialist literature. If they ever give any figures at all relating to their production, the saying of Dr. Stammer, "that the results obtained in refining are but seldom given exactly, and still more seldom in such a way that they can be employed for the purpose of making comparison with similar operations," is exceedingly applicable to them.

During the twelve months' operations which are dealt with in the following statements, the best quality of coarse-grained German beetroot sugar was employed in the refinery. It came principally from the Magdeburg, Brunswick, and Saxony districts, and admitted of being worked up satisfactorily and without any special difficulties.

To describe shortly the process of refining. The sugar was at first allowed to crystallise into candy (I. product for consumption). The syrup of this, mixed with good soft yellow sugar and certain clear syrups, was boiled down to loaves, second quality (No. II. product for consumption). Commoner moist sugar worked up with darker syrups, produced common crystallised sugar (granulated No. III. product for consumption), or material for putting back in the clarifiers for refining, to give loaf sugar. The syrup from the loaves yielded product No. III., the syrup draining off from this, mixed with that from the common lumps, yielded product No. IV. The green syrup of the latter, added to that of the water-lumps (one of the commonest

sorts of loaf sugar), gave No. V., and the syrup of this, after being osmosed, the sixth and last product. A portion of the dark soft sugar was boiled up for yellow or dark yellow candy.

The scheme given below affords a general idea of the manner of working.

Before dealing with the processes themselves a few remarks may be made on the mode employed in testing.

First of all as regards the determining of the water in the boiled-down mass and the sugar, this was effected in a current of air free from water and carbonic acid at a heat of 93° to 95° C. In the case of the boiled-down masses, which were mixed with quartz sand, 24 to 48 hours were always required for drying, before a constant (reliable) weight could be arrived at. This fully agrees with the observations of Dr. Stammer. The ash was determined by Dr. Scheibler's method with sulphuric acid, and reduced in the case of the first product by one-tenth, and of the other products by two-tenths of their total weight. The polarization was ascertained in the usual manner, by a very accurate Soleil-Ventzke-Scheibler saccharometer, due regard being constantly paid to the variable optical deviation and the acetate of lead precipitate. In fixing the apparent purity, the areometric indications were reduced to 17.5° C. according to the table drawn up by Dr. Stammer. The saccharine content of the bone black was ascertained by extraction in the Soxhlet-Sickel apparatus. Finally, the alkalinity was found by titration with one-tenth of normal nitric acid, the results being calculated to calcium-oxide and reckoned for 100 g. mass. Rosolic acid was adopted as indicator. All the analyses were conducted with the utmost possible exactitude, the more important being partially verified by repetition.

The weights are given in tons, and the greatest care was taken in this case also that the figures should be reliable.*

A.—THE CHARGE OF RAW SUGAR.

In the operations of the entire twelve months, 5,777.3 tons were worked up, and the geometrical average of the individual lots was as follows:—

* The weights of the different boiled down masses, the cassonades and the ratios of the raw sugar to the boiled down masses which are given in the original German, are in most cases omitted as being only of interest in those refineries which are worked in the continental manner.

	96.39 per cent. sugar.	
	1.60 „ water.	
	2.01 „ non-saccharine matter—	
	Of which : 0.99 ash.	
	1.02 organic matter.	
Per 100 dry :		Per 100 sugar :
97.96 sugar.		2.09 non-saccharine—
2.04 non-saccharine—		Of which : 1.03 ash.
Of which : 1.01 ash.		1.06 organic.
1.03 organic.		

Of the whole quantity, 1,878.9 tons = 32.52 per cent. were worked up in the raw state, and 3,898.4 tons = 67.48 per cent. treated with the centrifugals.

In the centrifugal process, the sugar was clayed with the white syrup of the loaves, and the working was so arranged that the syrup thrown off was not used again till it had been employed for mashing. The composition of the centrifugal syrup—used after clarifying for loaves, or more generally for the common crystallised sugar,—was as follows :—

	68.50 per cent. Brix.
	61.44 „ sugar.
	7.06 „ non-sugar—(undetermined).
	89.69 „ purity.

The white sugar issuing from the centrifugal answered three purposes. First, it yielded clearing; next, a certain amount gave fine liquor for waterclear crystals of candy; and finally some was dried, granulated, as required, and brought into trade as ordinary granulated sugars (like the III. quality for consumption).

B.—PRODUCTS.

First Product—Candy (for consumption).

This is obtained from the centrifugalled sugar, from better qualities of raw sugar, and now and then also from white granulated sugar, in very variable quantities. From the masses (charges) of the former and the latter, perfect and fine crystals were obtained, which in most cases were free from the characteristic stains (spots) so much disliked by manufacturers of candies. Of course, darker raw sugars of poorer quality produced common sorts, for which reason they were not usually worked up for

first product, unless there were some special demand. It may, however, be remarked, that good raw sugar of a high degree of purity and light colour yielded a product fully equal in every respect to that from the centrifugalled, so long as certain limits of alkalinity and temperature were carefully adhered to. The material of which the crystallising vats are made also plays a part which must not be overlooked in the manufacture of candy.

As the yellow candy is only very sparingly manufactured, it is included here in the total weight. It should further be mentioned that the crystals polarised about 99·8 to 99·9, and that the filtered syrups were almost entirely boiled up without lime (H_2CaO_2).

Filtered syrup for white candy :—

57·99	per cent.	Brix.
57·01	„	sugar.
0·98	„	non-sugar—(undetermined).
98·31	„	purity.
0·0043	„	alcalinity.

To 100 parts of sugar there would therefore be 0·0075 of alkali.

Fill-mass amounting to 3,291·726 tons was obtained, and gave 1,063·5 tons of sugar. Therefore,

100	raw sugar, thrown in	gave	56·98	fill-mass.
„	„	„	18·41	sugar.
„	fill-mass	„	32·31	„

The composition of the Fill-mass :—

81·15	per cent.	sugar.
17·94	„	water.
0·91	„	non-sugar—(undetermined).
Of which: 0·50 ash.		
0·41 organic.		

Calculated to 100 dry substances :	Which makes for 100 sugar :
98·89 sugar.	1·12 non-sugar—
1·14 non-sugar—	Of which: 0·62 ash.
Of which: 0·64 ash.	0·50 organic.
0·50 organic.	

The white candy averaged 100 polarisation.

The resulting syrup (the mother-lye of candy) was composed as follows :—

70.18	per cent.	Brix.
67.22	„	sugar.
2.96	„	non-sugar.
95.78	„	purity.

This formed the regular stock of the material for the second product, on which depends, as may easily be conceived, the further working out of the whole of the products which follow. The point to look to is that this syrup shall be neutral or very slightly alkaline. The amount of lime contained in the filtered syrup for candy must, consequently, be so calculated as just to hit the right medium, without prejudice to the good quality of the manufactured article. Unfortunately, this point is too often lost sight of. Some mother-lyes occur with about 0.02 to 0.03 per cent. of lime (CaO), and others with about 1.3 to 2.5 per cent. of glucose ($\text{C}_6\text{H}_{12}\text{O}_6$). Indeed, in the case of the syrups of the yellow candies, the formation of glucose was generally much greater. This may be indicated as a fruitful source of losses which cannot be accounted for. A good many further remarks might be made on this subject.

Product No. II.—Loaves, Cubes, and Granulated (for consumption).

A difference was made in the factory between first quality crystallised sugar in the form of loaves of 12.5 kilos. = 27½ lbs., pressed sugar in cubes, and crushed loaves and ordinary granulated. For the first, which is the principal product of the refinery, the syrups of white candy, the syrups of half-clayed loaves, the sugars of the third and partly of the fourth product, and also the unclayed loaves of common sugar,—but only seldom raw sugar, or syrup from the centrifugals—were clarified. The latter syrup consisted of dark liquors and sugars of the last products, so far as these were not used up for yellow candy. Further, this product includes also, as has already been mentioned, dried and ground centrifugalled raw sugar (of the best quality and nearly 100 polarisation).

The weights of the two qualities are not distinguished.

Filtered syrup for first quality, both loaves and cubes:—

55.50	per cent.	Brix.
53.33	„	sugar.
2.17	„	non-sugar.
96.09	„	purity.
0.0111	„	alkalinity.

Consequently the alkalinity per 100 sugar would be 0.0208.

Fill-mass, No. II. (a):—

86.15 per cent. sugar.
 10.98 „ water.
 2.87 „ non-sugar—
 Of which: 1.32 ash.
 1.55 organic.

Calculated to 100 parts dry substance:	Which gives for 100 sugar:
96.78 sugar.	3.33 non-sugar—
3.22 non-sugar—	Of which: 1.53 ash.
Of which: 1.48 ash.	1.80 organic.
1.74 organic.	

The polarisation of the loaves varied between 99.8 and 100.

On 100 parts of refined white sugar, there were used, according to the quality of the fill-mass:—

50 to 75 of clearing liquor,
 or, 34.2 to 51.3 sugar in that form.

The composition of this clearing liquor averaged as follows:—

68.42 per cent. sugar.
 31.08 „ water.
 0.50 „ non-sugar.
 0.0010 „ alkaline matters.

The syrups obtained gave the following analyses:—

Fine syrup:	White syrup:
70.04 per cent. Brix.	69.10 per cent. Brix.
66.81 „ sugar.	67.77 „ sugar.
3.23 „ non-sugar.	1.33 „ non-sugar.
95.39 „ purity.	98.08 „ purity.
0.0078 „ alkalinity.	0.0037 „ alkalinity.
In 100 parts sugar, 0.0117 alkalinity.	In 100 parts sugar, 0.0055 alkalinity.

This fine syrup was again taken for making loaf-sugar, and the white syrup used for clearing.

Fill-mass No. II. (b):—

82.13 per cent. sugar.
 10.06 „ water.
 7.81 „ non-sugar—
 Of which: 2.72 ash.
 5.09 organic.

Calculated to 100 parts dry substance :	Which gives for 100 sugar :
91.31 sugar.	9.52 non-sugar—
8.69 non-sugar—	Of which : 3.31 ash.
Of which : 3.02 ash.	6.21 organic.
5.67 organic.	

The sugar obtained from this boiled down mass No. II. (b), which was liquored with a clear syrup, polarised 99.4 to 99.8, with 0.3 to 0.1 of ash ; unclayed, its purity was from 97.5—98.5, with 1.0 to 0.5 ash.

The green syrup of this common loaf sugar was run off for product No. IV. ; the fine syrup, &c., for No. III.

Product No. III.

This was boiled and filled into large moulds, in charges of 80 kilos. = 176 lbs., and not liquored.

The sugar dried in from five to eight days.

Syrup (green syrup from the first quality loaves, and fine syrup from the common loaf sugar) boiled for the III. product, analysed :—

72.36	per cent.	Brix.
65.45	„	sugar.
6.91	„	non-sugar.
90.57	„	purity.
0.0252	„	alkalinity.

Equal to 0.0385 alkalinity per 100 parts sugar.

The fill-mass obtained analysed :—

79.62	per cent.	sugar.
12.47	„	water.
7.91	„	non-sugar—
Of which :	3.33	ash.
	4.58	organic.

Calculated to 100 parts dry substance :	Which makes for 100 parts
90.96 sugar.	sugar :
9.04 non-sugar—	9.94 non-sugar—
Of which : 3.80 ash.	Of which : 4.18 ash.
5.24 organic.	5.76 organic.

The granulated sugar from this analysed :—

93.62	per cent.	sugar.
2.24	„	water.
4.14	„	non-sugar—
Of which :	1.47	ash.
	2.67	organic.

Calculated to 100 parts dry substance:	Which gives for 100 parts
95.77 sugar.	sugar:
4.23 non-sugar—	4.41 non-sugar—
Of which: 1.50 ash.	Of which: 1.56 ash.
2.73 organic.	2.85 organic.

This sugar was again clarified for fine loaves.

Product No. IV.

This, as well as Product No. III., when boiled up was partly filled into large moulds, in charges of 165 lbs., and partly into smaller; the time occupied in running off the syrup and drying the sugar varied between 8 and 14 days.

The syrup (the green syrup of Product No. III. mixed with the green syrup of the ordinary crystallised sugar) to be boiled analysed:—

77.87 per cent.	Brix.
63.70	„ sugar.
14.17	„ non-sugar.
81.80	„ purity.
0.0436	„ alkalinity.

Equal to 0.0684 alkalinity per 100 parts sugar.

The fill-mass obtained analysed:—

72.22 per cent.	sugar.
13.43	„ water.
14.35	„ non-sugar—
Of which:	6.03 ash.
	8.32 organic.

Calculated to 100 parts dry substance:	Which gives for 100 parts
83.42 sugar.	sugar:
16.58 non-sugar—	19.87 non-sugar—
Of which: 6.97 ash.	Of which: 8.36 ash.
9.61 organic.	11.51 organic.

The granulated sugar obtained analysed:—

89.80 per cent.	sugar.
2.91	„ water.
7.29	„ non-sugar—
Of which:	3.89 ash.
	3.40 organic.

Calculated to 100 parts dry substance:	Which gives for 100 parts
92.49 sugar.	sugar:
7.51 non-sugar—	8.12 non-sugar—
Of which: 4.01 ash.	Of which: 4.33 ash.
3.50 organic.	3.79 organic.

This sugar was mostly worked up for common, and only seldom for fine loaf.

There yet remain as belonging to this product the different refuse waters resulting from the manufacture, according to their qualities, such as the whole of the sweet water from the filtering process, the washings of the moulds, and of the waggons used in removing the crystallised sugar, and of the cloths from the filter-press; in short, all waste matters containing small quantities of sugar were boiled down for this by-product. The result was a relatively very considerable quantity of sugar of an ugly grey colour.

The charge was not analysed; the composition of the granular sugar was as follows:—

88·86 per cent. sugar.
 3·24 „ water.
 7·90 „ non-sugar—
 Of which: 3·22 ash.
 4·68 organic.

Calculated to 100 parts dry substance:	Which gives for 100 parts
91·83 sugar.	sugar:
8·17 non-sugar—	8·89 non-sugar—
Of which: 3·33 ash.	Of which: 3·62 ash.
4·84 organic.	5·27 organic.

This also was worked up for second quality crystallized.

Product No. V.

This was boiled down and filled into the ordinary iron crystallizing pots, allowed to stand from four to five weeks, and then centrifugalled.

The syrup (green syrup of Product No. IV. and of the water lumps) to be boiled analysed:—

76·63 per cent. Brix.
 56·30 „ sugar.
 20·33 „ non-sugar.
 73·47 „ purity.

The alkalinity was not determined.

The fill-mass obtained analysed:—

67·65 per cent. Brix.
 11·76 „ water.
 20·59 „ non-sugar—
 Of which: 8·79 ash.
 11·80 organic.

Calculated to 100 parts dry substance :	Which gives for 100 parts
76·67 sugar.	sugar :
23·33 non-sugar—	30·43 non-sugar—
Of which : 9·96 ash.	Of which : 12·99 ash.
13·37 organic.	17·44 organic.

The granulated sugar obtained analysed :—

92·27 per cent.	sugar.
2·59	„ water.
5·14	„ non-sugar—
Of which : 2·52 ash.	
2·62 organic.	

Calculated to 100 parts dry substance :	Which gives for 100 parts
94·72 sugar.	sugar :
5·28 non-sugar—	5·58 non-sugar—
Of which : 2·59 ash.	Of which : 2·73 ash.
2·69 organic.	2·85 organic.

The sugar was worked up either for common crystallised or for yellow candy.

(To be continued.)

EXPERIMENTS ON SUGAR SOLUTIONS FOR DECOLOUR-IZING EFFECT OF BONE BLACK, BROWN COAL, PEAT, &c.

189, St. Vincent Street,

Glasgow,

26th November, 1884.

The *Sugar Cane* of November contains an article by Mr. P. Casamajor on the above subject, in reply to a former letter of mine on "brown coal" as a filtering and decolourizing agent. It is with extreme regret that I find a gentleman of Mr. Casamajor's attainments should so far forget himself as to stoop to personal abuse, especially in a matter which cannot rest upon the *assertions* of individuals either one way or the other, but must be patent on investigation to every chemist connected with the vast industry of sugar refining. I should be sorry to think that the statements in the article referred to giving comparative results were made by our friend knowing them to be untrue, or that he depended on his

sweeping statements preventing others from taking the trouble to investigate the matter, but I cannot conceive any circumstances, even under the most studied unfavourable conditions, which could give the results as stated by him, or prevent the "brown coal" from showing the most wonderful superiority in any comparison.

The following experiments, made by chemists whose names are sufficient guarantee, speak for themselves:—

The first table shows the results of analyses made by Messrs. McCowan and Biggart, Public Analysts, Greenock, and Analysts for sugars filtered (A) in the ordinary way (B) by the Remmers process, the Beet Sugar Association of Great Britain, of samples of various and (C) by Kleemann's process.

The column marked A gives the analysis of the untreated sugars dissolved in water as filtered through the ordinary bag filters, the column marked B that of the same sugars treated with char according to Remmers and Williamson's process, and the column marked C that of the same sugars treated with brown coal in accordance with Kleemann's process, about 10 per cent. of brown coal being used.

The analysts, in reporting the results of the analyses, remark that "When process 'C' is compared with either process 'A' or 'B' it becomes apparent at once that 'C' effects improvements peculiar to itself, and that in every point at which 'B' has produced any good result, 'C' also exercises a beneficial influence, but to a very much greater degree. If 'C' be compared with 'A' it is found to have effected the following improvements:—First—Colour.—The syrups of 'C' when tested against those of 'A' show that the treatment has removed—taking the result obtained from the 'C' samples—an average of 56.6 per cent. of colour. Second—Ash.—Process 'C' has also a marked influence upon this constituent, reducing it from 100 per cent. to 89 per cent., thus showing a removal of 11 per cent. (From beetroot sugar 20 per cent. of ash was removed by this process.) Third—Iron.—The result show that this process effects a material reduction in this constituent, one-third of the total iron being abstracted from the sugar.

"With reference to the uncrystallizable sugar, it cannot be said to remove any of this constituent, for although the analyses show a slight reduction, it corresponds exactly to the dilution of the syrup which the treatment by process 'C' effects."

	CURA SUGAR.			DATE JAGGERY.			DEMERARA CRYSTALS.		
	A.	B.	C.	A.	B.	C.	A.	B.	C.
Cane Sugar	90.38	91.28	91.88	89.90	89.81	90.38	97.45	97.50	97.70
Fruit Sugar	1.75	1.71	1.49	6.32	6.21	6.10	1.64	1.68	1.65
Organic Matter	4.95	4.81	4.51	3.05	3.25	2.80	.80	.72	.58
Ash	2.42	2.20	2.12	.73	.73	.72	.11	.16	.07
Total	100.	100.	100.	100.	100.	100.	100.	100.	100.
Nett Crystallizable Sugar obtained.....	77.03	78.57	79.79	79.83	79.85	80.68	95.26	95.32	95.70
Colouring Matter	100.	95.00	85.	100.	98.	25.	100.	100.	50.

	BLACK PERNAM.			JAVAS.			WEST INDIAN.			BEET.		
	A.	B.	C.	A.	B.	C.	A.	B.	C.	A.	B.	C.
Cane Sugar	91.61	92.10	92.30	98.60	98.70	98.77	92.95	93.16	93.31	97.02	97.20	97.45
Fruit Sugar	5.01	4.89	4.92	.85	.75	.74	4.65	4.68	4.51	0.00	0.00	0.00
Organic Matter	1.90	1.48	1.41	.34	.37	.35	1.45	1.21	1.25	1.80	1.60	1.60
Ash	1.48	1.53	1.37	.21	.18	.14	.95	.95	.93	1.18	1.20	0.95
Total	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.
Nett Crystallizable Sugar obtained.....	79.20	79.56	80.55	96.70	97.5	97.33	83.45	83.73	84.15	91.12	91.20	92.75
Colouring Matter	100.	98.	42.	100.	92.	45.	100.	90.	48.	100.	95.	50.

(COPY.)

City Analyst's Laboratory, 138, Bath Street,

Glasgow, 23rd February, 1884.

Chemical analyses of three samples of sugar liquor (from Pernam sugar), received on the 19th inst. from Messrs. B. H. Remmers and Co., St. Vincent Street.

A. Filtered through cloth only in press.

B. Treated with wood char and filtered in press.

C. Treated with brown coal and filtered in press.

	A.	B.	C.	Calculated to dryness.		
				A.	B.	C.
Cane Sugar	47.94..	48.16..	47.56	92.011 ..	92.20..	92.89
Fruit ,,	2.85..	2.74..	2.47	5.470 ..	5.25..	4.83
Extractive Matter. .	.73..	.67..	.60	1.401 ..	1.28..	1.13
Ash .....	.58..	.63..	.57	1.113 ..	1.21..	1.12
Water	47.90..	47.80..	48.80	— ..	— ..	—
	100.	100.	100.	100.	100.	100.
Net Crystallizable Sugar obtainable				80.94 ..	80.96..	82.46

A. and B. are exactly equal in depth of colour, but B. is much clearer than A. C. is just half the depth of colour of the others, and is perfectly clear and transparent. It will be seen that the extractive or organic matter is removed to some extent by the wood char and the brown coal, but to a larger extent by the latter.

I have no doubt from this experiment that the brown coal is superior to wood char.

(Signed) WILLIAM WALLACE.

(COPY.)

City Analyst's Laboratory, 138, Bath Street,

Glasgow, 21st April, 1884.

I have carefully tested two samples sugar liquor, received on the 18th inst. from Messrs. B. H. Remmers and Co., and have found as follows:—

No. 1. Filtered in the ordinary manner.

No. 2. Filtered through brown coal.

	No. 1.	No. 2.	Calculated to dryness.	
			No. 1.	No. 2.
Cane Sugar by difference..	44·59 ..	45·03	83·190 ..	83·235
Fruit „	7·81 ..	7·93	14·571 ..	14·658
Ash	·72 ..	·71	1·343 ..	1·312
Insoluble	Trace. ..	None.	— ..	—
Extractive Matter	·48 ..	·43	·896 ..	·795
Water	46·40 ..	45·90	— ..	—
	<u>100·</u> ..	<u>100·</u>	<u>100·</u> ..	<u>100·</u>
Cane Sugar obtainable....	35·33 ..	35·85	61·914 ..	62·017
Alkaline Salts in Ash	·29 ..	·25	·541 ..	·462
Alkali in ditto	·13 ..	·13	·242 ..	·221
Gravity at 60° F.	1·275 ..	1·261	— ..	—

No. 2 has only one-third of the depth of colour of No. 1, and is perfectly clear, whereas No. 1 is cloudy. Both contain the same amount of free alkali in the ash. No. 2 has a much more pleasant taste than No. 1.

(Signed) WILLIAM WALLACE.

(COPY.)

City Analyst's Laboratory, 138, Bath Street,

Glasgow, September 10th, 1884.

I have carefully analysed samples of sugar liquor made from low Java sugar before and after treatment with 10 per cent. of pulverized brown coal, received on the 4th inst. from Messrs. B. H. Remmers and Co., and have found as follows:—

	Before Treatment.	After Treatment.	Same calculated to Dryness.	
			No. 1.	No. 2.
Cane Sugar	48·80 ..	50·13	96·443 ..	96·590
Fruit „	1·07 ..	1·09	2·114 ..	2·110
Organic Matter	·28 ..	·26	·553 ..	·501
Ash	·45 ..	·42	·890 ..	·809
Water	49·40 ..	48·10	— ..	—
	<u>100·</u> ..	<u>100·</u>	<u>100·</u> ..	<u>100·</u>
Nett Sugar obtainable ..	45·48 ..	46·94	89·879 ..	90·445
Alkaline Salts in Ash	·33 ..	·31	·652 ..	·597
Free Alkali Potash	·06 ..	·06	·118 ..	·115
Comparative Colour	100 ..	44	—	—

The brown coal powder had been slightly damped, and contained 28·3 per cent. of moisture, or 7 to 8 per cent. more than the normal proportion. The quantity was therefore only about 9 per cent. of the weight of the sugar. The result shows an absorption of 56 per cent. of the colouring matter, and a small decrease in the proportion of organic matter and mineral salts.

(Signed) WILLIAM WALLACE.

(COPY.)

City Analyst's Laboratory, 138, Bath Street,

Glasgow, October 10th, 1884.

I have tested the effect of treatment with pulverized brown coal of low Jaggery sugar and two kinds of Demerara molasses, and have found as follows :—

With low Jaggery sugar an absorption of 59 per cent. of colour.

With light Demerara syrup ,, ,, 19 ,, ,,

With dark Demerara syrup ,, ,, 47 ,, ,,

In each case the liquor was made up to 28° B., and treated with 10 per cent. of brown coal for 15 minutes at 160° F.

The colours were somewhat different in the treated and untreated liquors in the first and third cases, making it somewhat difficult to judge of the respective depths of tint with accuracy. The intensities of colour were estimated by looking through a depth of liquor upon a white surface.

The light Demerara molasses were strongly acid, and this may have influenced the decolorizing action.

(Signed) WILLIAM WALLACE.

N.B.—The Demerara molasses were sent by Mr. W. Russell, of Demerara, who stated that they were of the lowest qualities, and only suitable for distilling purposes.

The light coloured molasses were obtained from the sulphuric acid process, and the dark coloured from sugar made for the American markets.

B. H. R.

(COPY.)

Chemical Laboratory, 29, Cathcart Street,

Greenock, 22nd November, 1884.

We have made experiments on the decolorising power of brown coal, and find the following results :—

	Java (Low).	Jaggery No. 1.	Jaggery No. 2.	Manilla.
Colour Removed....	65 %	55.6 %	53 %	59 %
	Pernambuco.	Pariaba.	Concrete.	Low Beet.
Colour Removed....	55 %	68 %	64 %	48.4 %

NOTE.—The brown coal was used in the state of a fine powder and an amount equal to 10 % of the sugar present in the syrup was employed. The liquors were heated to 165° F., and this temperature was maintained for 15 minutes.

McCOWAN AND BIGGART.

(COPY OF LETTER RECEIVED FROM E. M. DIXON, DATED 25TH
NOVEMBER, 1884.)

11, Hopetown Place, Glasgow,

25th November, 1884.

Dear Sir,

I have now to report to you the results of the experiments I lately made at your request upon the decolorizing powers of two samples of brown coal. These you sent to me under the respective designations of *German* and *English*.

Each was tested upon the four samples of raw sugar supplied me as the same time by you under the name of *Beet*, *Jaggery*, *Concrete*, and *Cuba Molasses*.

In every case the amount of brown coal formed 10 % of the sugar employed. The exact quantities used in each experiment were :—

Sugar	50 grams.
Brown Coal	5 grams.
Water	60 grams.

And these were digested together at 70° C. for 15 minutes.

Side by side with this set of experiments was a second set differing in no respect except the absence of brown coal.

Consequently the question before me after filtering off all the solutions was to compare, in the case of each of the four sugars, the intensities of colour in the three solutions prepared from each, viz. :—

Solution 1 made without brown coal.

Solution 2 made with German brown coal.

Solution 3 made with English brown coal.

As to the way in which this was done, I need merely say that the intensities were compared by ascertaining how far in each case Solution 1 required dilution with pure water to reduce its colouration to the level of Solutions 2 and 3 respectively.

The subjoined table shows results obtained :—

Beet.			Jaggery.			Concrete.			Cuba Molasses.		
1	2	3	1	2	3	1	2	3	1	2	3
100	48	38	100	25	25	100	35	35	100	40	34

These results prove that the English sample is in the case of some sugars more efficacious in the way of removing colour than the German sample.

Of both it may be said that according to the nature of the sugar, from 50 to 75 per cent. of the colour is removed by as much brown coal as is equal to 10 per cent. of the sugar operated on.

(COPY.)

City Analyst's Laboratory, 138, Bath Street,

Glasgow, 24th June, 1884.

Two samples of sugar liquor from Glebe Sugar Refinery, received on the 20th inst. from Messrs. B. H. Remmers and Co.

Seals :—None.

Labels :—(1) "Bags 2nd quality."

(2) "Press 2nd quality with brown coal."

	No. 1.		No. 2.		Same calculated to dryness.			
	No. 1.		No. 2.		No. 1.		No. 2.	
Cane Sugar	49.64	....	43.26	....	95.65	....	96.14	....
Fruit Sugar	1.71	....	1.27	....	3.29	....	2.82	....
Other Organic Matters ..	.08	....	.07	....	.15	....	.15	....
Ash .....	.47	....	.40	....	.91	....	.89	....
Water	48.10	....	55.00	....	—	....	—	....
	100.	....	100.	....	100.	....	100.	....
Cane Sugar obtainable ..	45.93	....	40.34	....	87.81	....	88.87	....
Alkaline Salts in Ash....	.40	....	.33	....	.77	....	.73	....
Alkalia (Potash) in Ash..	.11	....	.09	....	.21	....	.20	....
Specific Gravity	1.2168	....	1.2082	....	—	....	—	....

(Signed) WILLIAM WALLACE.

The Helmstedt Sugar Refinery, near Braunschweig, Germany, have already adopted Mr. Kleemann's brown coal process, and the results are that with the use of 20 % of brown coal they are now only using 10 % of animal charcoal, as against 70 % previously used by them, and

they anticipate the possibility of shortly being able to dispense with the animal charcoal altogether.

I have abstained from giving you the results of hundreds of experiments on the point at issue, which have been conducted in my firm's laboratory, believing that your readers will, for the present, have received a sufficient surfeit of facts. At some future time I shall be happy to send you the details of a series of experiments carried out with the view of showing the relative decolourizing power of animal charcoal and brown coal both in the finely pulverized condition and rising from low to high percentages. The results obtained I am sure will both interest and astonish your readers. It will afford me much pleasure to forward samples of the "brown coal," with particulars as to the most favourable conditions for its use, to any chemist desirous of satisfying himself of the wonderful results to be obtained, and the important position it must in future take in sugar refining.

Yours truly,

B. H. REMMERS.

MR. CASAMAJOR ON BROWN COAL AS A
DECOLOURIZER.

New York, Dec. 7th, 1884.

TO THE EDITOR OF THE "SUGAR CANE."

Sir,—In the November number of the *Sugar Cane* is an article by me on experiments with bone black, vegetable charcoal, brown coal, &c., to show their decolourising effects on solutions of raw sugar.

I write now to say that brown coal has certainly a greater decolourising effect than I had stated. It may also be that, by proceeding differently from the method I used, bituminous coal, anthracite, &c., may also give improved results. As to brown coal, there is no doubt that my results were too low. Within a week, Mr. D. M. Service, the agent of the "Sugar Appliances Company" of Glasgow, was two days in my laboratory, to show the decolourising effect of brown coal. He treated two solutions of raw sugar, each with 10 per cent. of brown coal. One of these was of Hilo-hilo mats of about 86 coefficient of purity. The decolouration was equal to 33 per cent. The other sugar was a *muscovado* of 88% cost of production. The decolouration with the latter sugar was equal to 60 per cent.

The only things which Mr. Service did to obtain these improved results, beyond what I had done, were, in the first place, to use moist brown coal, while I used this material dry; and, in the second place, to leave the sugar solution a longer time in contact with the brown coal. The samples of brown coal I had received from Glascan came in paper bags by mail, and the material was consequently dry. The brown coal used by Mr. Service contained, according to his estimate, about 25 per cent. of water.

As to the power of brown coal to facilitate filtration, the Hilo-Hilo sugar filtered pretty well with 10 per cent. of brown coal. Mr. Service thinks that with that particular sugar the filtration would have been better with 15 per cent. of brown coal.

As to the *muscovado* sugar, 7 per cent. of brown coal gave an unsatisfactory result, but 10 per cent. gave a good cake, with a flow equivalent to $2\frac{1}{2}$ gallons per square foot of filtering surface.

All the solutions passed through very clear. I must also add that the solutions from muscovado sugar were afterwards filtered over bone black, and that the filtered solutions showed that the one treated with brown coal gave a much better colour than the untreated liquor.

I could not give an opinion as to the value of brown coal as a decolouriser. This depends entirely on the price at which a refiner can actually buy it. As an additional amount of boneblack can always give a decolourising effect equal to that due to treatment by brown coal, every refiner can calculate for himself the comparative cost of using either brown coal or an additional quantity of boneblack.

As to Mr. Service, I will here take the opportunity to congratulate the "Sugar Appliances Company" on their choice of an Agent. He is entirely free from the habit of gross exaggeration, too common with persons seeking to introduce new processes. His manner conveys the impression that he is truthful and straightforward, and therefore worthy of confidence.

I hope soon to send you a communication on another subject.

Yours very truly,

P. CASAMAJOR.

MR. T. NEILL ON SUGAR BOUNTIES.*

We commend to the attention of the Board of Trade in general and Mr. Giffen in particular a pamphlet that has been published setting out in brief and clear terms the whole "case" of the sugar trade as against the foreign bounty system. We do so not because we agree in all that this valuable pamphlet advances, but because we feel that the Board of Trade has not yet thoroughly understood the arguments that it contends it has finally answered. This will be at once evident from a summary account of the pamphlet itself.

The author, Mr. T. Neill, is a well known and experienced sugar refiner; and he writes in a dispassionate spirit which will do his cause far greater service than the passionate and obviously biassed denunciations that are far too common in this controversy. The issue of the pamphlet is explained in the words,—“At the request of a “number of working men directly interested, as all workmen are, in “the preservation of British industry, and directly and indirectly “interested in the preservation of the special industries selected for “attack by foreign Governments, and who desire to have, in as “short a compass as possible, the leading facts and opinions on the “foreign bounty question presented to them, I have written the “following pages.”

There next follows an account of the “diplomatic efforts made by the Government of this country to obtain the abolition of the bounties,” which provides an explicit summary of what diplomacy has attempted. Commencing with the declaration in 1863 of the French Government that “it is the desire of France, and no doubt “of other countries too, to relieve the Treasury of a charge, *the only* “effect of which is to permit refined sugar to be sent to foreign markets at “a reduced price,” the account tells of the five Conferences that were held in rapid succession, in the years 1864, 1865, 1866, 1868, and 1869; and how the series was then interrupted by the Franco-German war, but renewed in the years 1873 and 1874; in which year the French National Assembly “voted by a majority of 364 to 267 in favour of refining in bond;” and again there were Conferences in 1875 and 1877, and invitations were issued for a final Conference in 1881,

* Foreign Bounties: how they affect working men and consumers. By T. Neill. W. Hutchison, Greenock, 1884.

which only failed because Great Britain declined to assist on the conditions laid down by France. The fact that no less than nine Conferences for the abolition of bounties should have been held in 18 years, and chiefly on the initiative of the Continental Powers, is not quite in agreement with Mr. Neill's original contention that foreign Governments, by their bounty systems, have specially selected the British sugar industry for attack. Mr. Neill, however, is rightly of opinion that this record seems to show that "diplomacy has utterly failed to have the evil removed." But we must not therefore give up all hopes for the future; indeed, in our opinion, the very fact that so many attempts have been made at such short intervals goes far to prove that diplomacy may succeed in the end, for they show that among the nations concerned there is at all events a will, if only we can find a way.

Working men, for whom this pamphlet is specially written, will profit not less than the Board of Trade authorities by the perusal of the clear account Mr. Neill gives as to "how the bounty is given," which is summed up in the general result that "fabricants" in the various continental countries actually obtain a bonus of from 1s. 9d. to 3s. per cwt. In the description that follows of the effects of the bounties on raw and refined sugars respectively, the figures given are well worthy the close attention of the Board of Trade. Mr. Neill, indeed, assumes throughout that the bounties are the one only cause of all the results he tabulates, but among these results are two startling facts. The one is, that "the increase in the importation of soft sugar in 1884 over 1882 is 97 per cent.; and the other is, Mr. Neill points out, that "in 1864 the quantity of foreign refined sugar used "in this country was only about $2\frac{3}{4}$ per cent. of the total quantity of "sugar consumed. Under the bounty system the quantity has been "gradually increasing year by year, until it has reached 20 per cent."

In regard to the effects of bounties on raw sugar, Mr. Neill is not quite so successful in his statement. This is much to be regretted, as there is plenty of exact evidence which he has not adduced. His adversaries are sure to take hold of the somewhat contradictory statement as to the "demand for cane sugar having materially fallen off, and that a very large percentage of cane sugar has been replaced" by beet—placed in such close juxtaposition to the statement that in 1864 we consumed 523,203 tons of cane sugar, and in 1884 598,001 tons. But he is perfectly right in declaring that cane sugar can

be produced at less cost than beet. He weakens his case by agreeing with Mr. Ritchie's Committee that cane cultivation in the West Indies is at all perfect, or that "no want of attention can be charged against the growers"—because, as a matter of fact, very much remains to be accomplished by way of improved methods of agriculture and manufacture in nearly every one of our West Indian colonies.

Mr. Neill states well and concisely the effects of bounties to the British consumer. "It ought to be clearly kept in view what amount of the reduction in the price of sugar which has recently taken place is due to natural economic laws and what amount to bounties. To the reduction from the former cause the British consumer is legitimately entitled to its fullest extent, and neither the colonial producer nor the home refiner can, nor I believe does, make the slightest complaint. . . . To the reduction of price under the latter of the two causes mentioned above, viz., State aid or bounties, there is no system of political economy yet promulgated which asserts that the consumer has any legitimate claim. It is to the reduction from this latter clause alone that both the colonial producer and the home refiner enter their protest, and desire the Government to adopt an efficacious remedy."

In estimating the amount of fall in price due to bounties Mr. Neill shows conclusively that the whole of the bounty received is not expended in lowering prices, but only sufficient of it to enable the recipient to undersell English sugar in the English market: the remainder he retains, and the English consumer only gains that fall in price which is necessary to enable the foreigner to undersell the English producer. Mr. Neill does not enter into the wider argument as to the effect of bounties in causing overproduction and artificial glut of neutral markets. In discussing "the remedy" Mr. Neill has not noticed that the Select Committee did not, as he contends, report that a countervailing duty should be imposed, although he is quite correct in stating they reported in favour of manufacturing and refining "in bond." The international position, however, could not be better put than in Mr. Neill's words:—"Why, then, is it that when most of the bounty-giving countries profess a desire to abolish bounties on sugar they still exist in every sugar producing Continental state? The reason is, because they say no one state can individually cease to give bounties so long as its neigh-

“bour continues to give them, otherwise its manufacturers and “refiners would be thrown out of the markets of the chief consuming country so long as that country is willing to admit bounty-fed “sugar on the same terms as free-trade sugar.” Mr. Neill next points out that France demands adhesion to the principle of countervailing duties, although England “and, perhaps, Holland” are unwilling to agree to such a condition. Mr. Neill scores a decided point in reminding us that Cobden’s main argument was contained in the words, “we require corn at the natural price of the world’s “market . . . every source of supply freely opened;” and, on this he asks, “how can the natural price be restored to an article on “which a bounty is given?” with the obvious reply that either the bounty must be abolished or the importing country must put on “a duty exactly equivalent to the bounty given.”

The passages in this pamphlet showing that the particular countervailing duty proposed is not in itself contrary to free-trade principles; that it is not a protective duty; that in principle it could not be extended except to commodities that had received bounties; that it is not a retaliatory duty—are all clear expositions of the arguments with which Mr. Giffen must contend. In disposing of the objection that such a duty would be an infringement of “most “favoured nation” treaties, Mr. Neill’s chief argument is that the duty would be imposed on the bounty and not on the sugar, asserting that “the countries sending bounty-fed sugar would be treated “alike. . . . If they wished their sugar admitted on the same “terms as non-bounty giving countries, all they would have to do “would be to comply with the conditions which this country insisted “on in the importation of sugar, namely, that it should not be “bounty-fed.” His argument comes practically to a request to Government simply to place as an item in our Customs tariff—applicable to all nations alike—“Sugar, bounty fed, duty equal to “amount of bounty received—all other sugars free.” We are afraid, however, that our Customs authorities have already declared they can only take cognisance of goods as they receive them, and that while it would be possible to tax *beet sugar* and allow *cane sugar* to enter free, it would not be competent for them to draw distinctions according to what takes place elsewhere, but of which they have no evidence in the goods themselves.

In regard to the benefits of which a countervailing duty is declared

to deprive the consumer and the refiner, Mr. Neill points out that the advantage to the consumer is, after all, but infinitesimal—"fourpence in the year per head of population"—and that all that the manufacturer really needs is to obtain his raw material at equal prices to his competitors. He argues that even the mere threat of such a duty would at once bring bounty-giving countries to terms, and that in this respect it differs from mere retaliatory tariffs, in that it destroys directly the effect of the bounty and thus cuts away the only cause of its existence.

Altogether the arguments are stated with a clearness, brevity, and force that is bracing, and, as we have said, the pamphlet must be carefully studied by the Government authorities if they wish to know what arguments are being, and will be, pressed forward to influence public opinion. "It is the abolition of bounties that is demanded. The countervailing duty is only a means to that end. If the Government can secure the abolition of the bounties by any other method . . . then such a duty will not be asked for." The great object is that sugar, whether as a raw material or as a commodity ready for consumption, should be obtained in England "at its natural price, and with every natural source of supply freely open." Mr. Neill's pamphlet is calculated to render valuable aid at the present time, and it should be closely studied not only by those who are agitating this question, but also by those advisers of the Government who have discountenanced further action in the matter. It appears to us that all possible pressure should be brought to bear on Government to place the whole question in the hands of a special Commission, composed of two or three unbiassed and properly qualified experts, with instructions to negotiate forthwith for a Convention among the powers interested. With a full and firm conviction as to the end to be secured, such a special Commission would readily devise some efficient means.

QUEENSLAND.

In a recent number of the *Deutsche Zuckerindustrie* is an extract from the "Export" warning all Germans against emigration to Queensland, from which an emigration agent has been sent to Germany to engage men for three years at 10s. per week, while the regular pay is £40 and £50 per annum.

SIR W. B. FORWOOD ON "FAIR TRADE."

Sir W. B. Forwood writes to the *Standard* as follows:—"I think if the advocates of 'Fair Trade' as a remedy for the existing depression would make inquiry in America—the home of 'Fair Trade'—they would find the depression existing in that country is tenfold in its intensity to what we are experiencing here; and the cry there is becoming louder every day that Protection is played out, and that the only hope of a restoration of prosperity lies in the gradual adoption of 'Free Trade.' It is not merely that the depression is intense; there are towns where not a single factory has worked for months past, and tens of thousands of working men are literally starving; but there is no hope that things can be better, their only customers are their own people. The tariff practically prohibits exports; and it is said that there are sufficient cotton and woollen factories and ironworks to produce in six what they can consume in 12 months. Here in England Free Trade enables us with confidence to look for brighter days—the world are our customers, and in whatever corner of the world trade improves we feel it directly in an increased demand for our manufactures. Great harvests such as we have had everywhere, mean cheap food for the people and an increased purchasing power, and have been invariably the precursors of periods of prosperity. Already the spindles and looms of Lancashire are more actively and profitably employed than for years past. Cotton is always the first article to feel the improvement, as the first spare money very properly goes for clothing. I by no means take a desponding view of the future, and certainly my recent experience in America leads me to denounce the present Fair Trade cry as one of the most mischievous and pernicious cries ever raised in this country."

Liverpool is the great stronghold of Conservatism. In no place in England, if we except those insignificant hamlets in the midland and southern counties under Squirearchy domination, is Toryism more rampant than in Liverpool. Sir W. B. Forwood is the foremost figure in the Conservative ranks in Liverpool, and the leader of the "Tory Democracy" there. The foregoing letter denouncing "Fair Trade" "as one of the most mischievous and most pernicious cries ever raised in this country" is therefore significant.

STATEMENT, SHOWING THE ENTIRE EXPORTS OF SUGAR FROM CUBA,
WITH ESTIMATED HOME CONSUMPTION—FOR TWELVE YEARS, 1873 TO 1884—WITH TOTAL PRODUCTION.

Compiled from the most reliable private sources.—(*Havana Weekly Report.*)

	1884.		1883.		1882.		1881.		1880.		1879.	
	Boxes.	Hhds.	Boxes.	Hhds.	Boxes.	Hhds.	Boxes.	Hhds.	Boxes.	Hhds.	Boxes.	Hhds.
Total export, 1st January to 31st July	36537	622287	41577	548191	122468	629045	97664	564245	156986	589960	291109	781606
Less Stocks at commencement of the year	11423	40297	18381	23615	20762	15927	25154	18425	23399	27656	38441	31120
	25114	582000	23196	524576	101706	613118	72510	545820	133587	561304	252668	750486
Home consumption, estimated..	175009	....	150000	....	150000	....	150000	....	150000	....	150000	....
Total Stocks on hand, 31st July.	75187	159989	47728	133459	152867	186584	99859	92742	138961	131400	117906	96228
Receipts from 31st July to end of year 1884 (estimated)	275301	741989	220924	658035	404573	799702	322369	638562	422548	692704	520574	846714
	4600	27035	2306	28050	751	13137	1953	17369	8652	30557	20223	51949
Total Production	279901	769024	223230	686085	405324	812839	324322	655931	431200	723261	540797	898663
Equivalent in Tons	549,038		484,976		600,357		483,945		547,089		680,700	
Total Stocks on hand, 31st December, } including new sugar..... }	1884.	1883.	1882.	1881.	1880.	1879.						
	....	28,265	18,651	14,109	16,530	22,200 tons.						

EXPORTS OF SUGAR FROM CUBA.—CONTINUED.

	1878.		1877.		1876.		1875.		1874.		1873.	
	Boxes.	Hhds.	Boxes.	Hhds.	Boxes.	Hhds.	Boxes.	Hhds.	Boxes.	Hhds.	Boxes.	Hhds.
Total export, 1st January to 31st July	268444	499114	293187	490270	561152	595813	783934	663672	857068	615990	959736	557378
Less Stocks at commencement of the year	56916	14053	32213	8128	29458	13998	40653	8047	30456	6245	29068	6723
	211528	485061	260974	482142	531694	581815	743281	655625	826612	609745	930668	550665
Home consumption, estimated ..	150000	....	150000	....	160000	....	160000	....	180000	....	180000	....
Total Stocks on hand, 31st July.	167663	135842	290184	79658	241208	28161	357473	53664	274632	28351	429927	100174
Receipts from 31st July to end of year 1884 (estimated)	529191	620903	701158	561800	932902	609976	1260754	700289	1281244	638096	1540595	650829
	32102	57494	21193	26840	26275	12896	40883	13923	32786	26522	64673	40713
Total Production	561293	678397	722351	588740	959177	622872	1301437	723212	1314030	664618	1695268	691542
Equivalent in Tons	530,598		505,553		572,000		699,000		666,000		738,000	

Total Stocks on hand, 31st December, }
 including new sugar

TODD, HILDALGO & CO.

Havana, November 1st, 1884.

LORD DERBY AND THE LAND QUESTION IN THE LEEWARD ISLANDS.

On September 24, Lord Derby wrote a despatch to Governor Sir C. C. Lees on the land question in the Leeward Islands. Sir John Gorrie, the Chief Justice, in a report addressed to the Governor, recommends that the system of securing an indefeasible title to land by registration should be put in force in the Leeward Islands by passing a new Act in place of that of 1873, which has remained a dead letter. He proposes to make the Registrar of Titles, with his deputies in the different islands, the responsible person for effecting the change, and to make the change compulsory by requiring all dealings with land after a certain date to be under the new system. Certificates of title would be the sole evidence of title after a date to be fixed. Lord Derby authorises the Chief Justice to draft a bill to give effect to these changes, provided that the Governor, after consultation with his Executive Council sees no objection to them. Upon Sir John Gorrie's proposals to give to the Supreme Court of the Colony the powers of the present West Indian Incumbered Estates Court, and to regulate the consignees' lien so as to protect the rights of mortgagees, Lord Derby intends to write to Sir C. C. Lees on a future occasion. He however, sees no objection to the first of these proposals. Sir John Gorrie proposed to guarantee the repayment of mortgages by the formation of a Guarantee or Insurance Fund, but Lord Derby declines to entertain "any proposal for the interference of the State in mortgage transactions." In conclusion his lordship requests the Governor to thank the Chief Justice for his "valuable report."

NATAL CENTRAL SUGAR COMPANY, LIMITED.

In the *Sugar Cane* for November, 1883, page 564, we noticed the fourth annual report of this Company, for the year ending May 31, 1883; we have now before us the fifth annual report for the year ending May 31, 1884. In the previous year a dividend of 6%, amounting to £6,000, was paid, leaving a balance of £975 6s. 10d. to be carried forward. It will surprise no one that the result of this year's working leaves no margin for any dividend.

The crop for the year under review was 3,431 tons, against 1,808 tons in the previous year. Notwithstanding this, the profit and loss account shows

a loss upon the year of £376 7s. 3d. If this represented the actual state of the case, the directors, considering the serious fall in values (from May, 1883, to May, 1884, about 6s. per cwt.), might have congratulated themselves upon having scraped through so well, but we see in the assets a rather ominous item, "sugar unrealized, £18,798;" this was in May, 1884. In the report which is dated November, 1884, no mention is made of this asset having been realized. In any case, there is certain to be a loss, and it may be a serious one, arising from this source, to be dealt with in the next balance sheet.

The ordinary expenditure, amounting to £23,765, against £15,607 in the previous year, shows the heavy increase of £8,158. This, the report says, "is mainly due to the expansion of the Company's business, but is also, to "a considerable extent, exceptional and in part owing to scarcity of indentured Coolie labour, which necessitated the employment of free Indians at "high wages. Some items, such as contract work and fuel, are likely hereafter to show more favourably, through an expected better supply of "labour diminishing the necessity for the one, and improved machinery "lessening the requirement for the other."

Under the head "extraordinary expenditure," namely, additions to property and machinery, live stock, rolling stock, &c., a sum of £5,033 12s. 10d. has been written off, but we notice also that £6,591 12s. 10d. have been expended, under these heads, during the year, and the amounts charged to capital account.

The ordinary expenditure, £23,765 19s. 5d., is made up of the following items:—

	£	s.	d.		£	s.	d.
Salaries and Wages..	9,007	17	1	Manufacturing Re-			
Rations	2,742	15	0	quisites	821	0	1
Coolie Immigration..	928	16	0	Interest	837	15	11
Contract Work	3,230	8	11	Guano	1,784	9	4
Maintenance of Ma-				Rail Carriage from			
chinery and Plant	1,080	4	10	Town	479	16	9
Fuel	2,004	15	7	Sundry Charges	705	3	11
				Directors' Fees	142	16	0

If to the ordinary expenditure we add the amounts written off exceptional expenditure accounts (for, although termed exceptional, they almost always appear, or ought to appear, in a proper balance sheet), and if to these two we add common interest upon the £100,000 stock, it brings the total up to £33,799 12s. 3d., which, upon the crop for the year under review, namely, 3,434 tons, an unusually good one, makes the cost per ton £9 17s.—on the spot.

HANDSOME OFFER OF £10,000 FROM MR. HENRY TATE FOR A HOMŒOPATHIC HOSPITAL FOR LIVERPOOL.

The following letter has been addressed by Mr. Henry Tate, sugar refiner, of London and Liverpool, to the Committee of the Homœopathic Dispensary in Liverpool :—

Parkhill, Streatham Common, London,
November 6th, 1884.

Dear Dr. Drysdale,—I have much pleasure in informing you that I have bought the land in Hope-street, bounded by Hope-place on the north and Rice-street on the south, upon which I intend to carry out a long cherished idea of building a hospital in which the poor may be treated homœopathically, and in accordance with the most advanced principles of medical science. My long connection with the management of the homœopathic dispensaries in Liverpool, where I have been an eye-witness of the good done to so many thousands of the poor, together with the benefits my family and myself have derived, have induced me to take this step. I have a great wish that the poor in Liverpool should enjoy the advantage of a hospital such as is possessed by many other large towns, where they may be treated homœopathically, and also that a fair comparison may be afforded between the cases treated in this hospital and those treated in the hospitals where the allopathic system is still adopted, and so in this way I hope the cause of medical science may be advanced. The outlay I propose to make on building and furnishing, and including cost of land—which you will be glad to know is of sufficient area to admit of considerable extensions to the hospital in the future—is £10,000.

As regards the building, the first business will be to find a recently built hospital that we can take as a model, making such improvements upon it as may be desirable. I understand from Dr. Hayward that the homœopathic doctors of Liverpool are willing to take the hospital under their care, as far as the medical treatment of the patients is concerned. Thinking, as I do, that each generation should support its own charities, I do not intend to endow this hospital. Its work, therefore, cannot commence until subscriptions and donations amount to the estimated annual expenditure. But I am sanguine enough to believe that the funds necessary for maintaining such an institution will be readily forthcoming from the very large number of people in Liverpool and the neighbourhood who have benefited by the method discovered by Hahnemann, and since developed with such signal success in this and other countries.—Yours truly,

HENRY TATE.

A COMPARISON OF THE COST OF LABOUR, AND THE PRICE OF PROVISIONS, BETWEEN 1834 AND 1884.

A very carefully-prepared paper on the economic and social conditions of Manchester and the surrounding districts, as they exist now, and as they were fifty years ago, was read in November last, before the Manchester Statistical Society, by its President, Mr. Robert Montgomery. Although the statistics refer specially to Manchester and the neighbourhood, they are applicable to all parts of Great Britain where manufacturing is carried on, and even to many agricultural counties.

As a result of careful investigation, Mr. Montgomery shows that the increase in the wages during the fifty years averages 40 per cent.—that is to say, where 10s. was paid fifty years ago, 14s. is now paid; and if we take into account the lessened cost of the principal necessities of life (for whilst some articles of food, such as meat, milk, butter, potatoes, and cheese have advanced from 10 to about 50 per cent., others have fallen to a much greater degree), which averages about 18 per cent., this 14s. is equivalent to 16s. 6d.

We all know that wages are much higher now, and the cost of many articles of food is much less; but it is only by a reference to statistics such as Mr. Montgomery furnishes, that we fully realize their extent.

The following gives the increase in wages in the respective trades:—

Trades.	Percentage of increase.	Trades.	Percentage of increase.
Spinning	63	Mechanical engineering..	18
Weaving	43	Glass-making.....	40
Drying.....	16	Macclesfield silk trade ..	37
Calico printing	46	Building trades	46
Calendering	47	Tailoring	53
Bleaching	32	Police	46

Average per cent. of increase for all trades, 1834 to 1884, 40 $\frac{1}{2}$.

The following prices of the different articles of food, are taken from the books of the Manchester Infirmary for 1834 and 1884:—

	Prices.		Percentage.	
	1833-84.	1833-34.	Increase.	Decrease.
Flour, per sack	35s.*	38s.	—	8
Meat, per lb.	7½d.	5d.*	48	—
Milk, per doz. quarts....	2s. 6d.	2s. 2d.	15	—
Butter, per lb.	1s. 2d.	10d.	40	—
Cheese, per cwt.	66s. 4d.	60s.	11	—
Coffee, per lb.	1s.	1s. 10d.	—	46
Tea, per lb.	1s. 9½d.	5s.	—	65
Potatoes, per load.....	9s. 8½d.	7s. 6d.	29	—
Coals, per ton	9s. 0½d.	11s. 8d.	—	23
Soap, per cwt.	30s.*	50s. 6d.	—	40
Sugar, per cwt.	26s.	72s.	—	64
Gas, 1,000ft.	2s. 8¾d.	10s. 3d.	—	74

Rent is not brought into the account—but respecting this Mr. Montgomery says: “Rent is probably a larger item in the expenditure of a householder living in a town than it was in 1834. The price of land affects the rent, and has increased manifold; but in this matter as in those of food and clothing, our standard of comfort is higher, and if we pay more rent, we get a better house.”

Mr. Montgomery after commenting upon the large sums, out of the savings of the working classes, which are invested in Co-operative Stores and Limited Companies, concludes his instructive paper as follows:—

The inhabitants of Manchester are now enjoying these advantages of communal life, most of which were wanting 50 years ago, literally without cost, for in the year 1834 the local rates in the township were 4s. 11d. in the pound, and in this year they are only 4s. 4d. In knowledge, manners, and even in morals there is improvement to note in the past fifty years. Education is more diffused, and assuredly more thorough. In economic conditions the advantage has been with the workman rather than the master, and this will remain with him if he will save his money and employ his political influence and power of combination in fostering the growth of capital and applying it to productive uses. In the social progress of half a century all classes have shared; the poor most of all. And in a fuller civic life, wider corporate action and a more fruitful use of the nation's power, it may be anticipated that the working classes will enjoy a still more conspicuous advantage.

* Estimated.

DR. VOELCKER ON THE CHEMISTRY OF ENSILAGE.

We regret we have to record the death, in his 62nd year, of this eminent agricultural chemist, which took place on December 5. Besides being a Fellow of the Royal Society, he was for upwards of 20 years consulting chemist to the Royal Agricultural Society of England, and it is from the last number of the journal of this Society that the following extracts on ensilage are taken:—

In 1883, Mr. George Fry, of Chobham, filled a silo with *Trifolium incarnatum*, "rough grass," and "clover rye grass," between the 7th and 30th June; the temperature recorded at the time of covering being 132 deg. F., 6 feet from the surface; the silo was then weighted with 12 inches of sand. On July 11, and again on the 17th, the cover was taken off, and the silo was filled with meadow grass sufficient to replenish the space caused by settling; the temperature observed at these dates was 140 deg. F., at a depth of 6 feet. In another silo filled with clover and rye grass and meadow grass between June 30th and July 11th, after which the silo was weighted with sand, the recorded temperatures were, on July 7th, 149 deg. F., and on July 14th, 158 deg. F. The resulting silage was free from acidity, sweet, and of an agreeable fruity odour, much resembling that of good hay, and was eaten by apparent relish by cattle, sheep, and horses.

In filling silos, most writers on ensilage give directions which are based on Liebig's chemical theory of fermentation; they recommend the thorough consolidation of the grass fodder as it is put in, the rapid filling of the silo, and the covering up and weighting of it at once, in order to prevent, as far as possible, the exposure of the fodder to the oxygen of the atmosphere, which is assumed to be the exciting cause of fermentation. Pasteur's recent investigations, however, have greatly enlarged our knowledge of the conditions which favour fermentation. He has shown that oxygen itself is not directly concerned in the process, but that certain living ferments and germs, generating various kinds of bacteria of fermentation, greatly modify the character of the silage produced.

It would appear that a temperature of about 125 deg. is sufficiently high to kill the bacteria which produce acid fermentation, and if the bacteria are killed, and the silo is covered and weighted, the enclosed mass of green fodder will remain sweet, and be perfectly preserved under the same conditions as fruits, vegetables, or meats are preserved when canned. If this be the case, it will be at once intelligible that by less packing of the fodder when put into the silo, and extending the time until the temperature rises

to a point which is fatal to the bacteria, the resulting silage will be sweet, and free from acidity; while sour silage is produced by at once consolidating, covering up, and weighting the green fodder, so as to prevent the temperature rising to the point fatal to the bacteria.

A sample of "sweet" silage was sent to me for analysis on the 24th of December, 1883, by Lord Middleton, Applecross, Ross-shire. It was made from oats, cut green and chaffed. It has the following compositions:—

Water	74·80
*Albuminous compounds	2·18
Sugar and other carbo-hydrates soluble in water..	2·78
Crude vegetable fibre.....	18·84
Mineral matter (ash)	1·40
	<hr/>
	100·00
	<hr/>

The taste of this sample was very sweet, and the smell quite fragrant, like that of well-made good hay. It kept well for about ten days, and turned mouldy.

Lord Middleton sent me on the same day (Dec. 24, 1883) another sample, which was made from unchopped meadow grass, put into the silo in September, 1883.

On analysis, the meadow grass silage was found to have the following compositions:—

Water	74·40
†Albuminous compounds	1·62
Soluble carbo-hydrates	2·87
Conde vegetable fibre.....	19·27
Mineral matter (ash)	1·84
	<hr/>
	100·00
	<hr/>

The sample was of good quality, and kept better than the sweet chopped oats silage, which contained mere traces of acid; whilst that from unchopped meadow grass was decidedly acid, and contained about $\frac{1}{4}$ per cent. of butyric and other soluble acids, and about the same proportion of non-volatile lactic acid.

*Containing hydrogen.....	·35
Volatile acids, calculated as acetic acid.....	·07
Non volatile acids, calculated as lactic acids	·01
†Containing nitrogen	·42
Volatile acids, calculated as acetic acid.....	·21
Non-volatile acids, calculated as acetic acid	·22

Mr. E. B. Gibson, of Saffron Walden, also sent me a sample of sweet silage, which, on analysis in January, 1884, gave the following results:—

Water	75·60
*Albuminous compounds	2·62
Soluble carbo-hydrates	2·04
Crude fibre	17·85
Mineral matter (ash)	1·89
	<hr/>
	100·00
	<hr/>

It will be seen that this sample contained scarcely any volatile or non-volatile acids. It kept fairly well for about a fortnight, and then turned mouldy.

On the 12th of November, 1883, I received from Mr. E. B. Gibson a sample of clover and sainfoin silage, which I submitted to a detailed analysis.

This sample contained only $57\frac{1}{2}$ per cent. of water. It was decidedly acid, and found to contain in round numbers $\frac{3}{4}$ per cent. of lactic acid and $\frac{1}{4}$ per cent. of volatile acid, and went rapidly mouldy.

Composition of a sample of clover and sainfoin silage sent by Mr. Edmund B. Gibson, Saffron Walden, November 12, 1883.

SOLUBLE IN WATER 70·36 PER CENT.

Water	57·55
Soluble albuminoids	3·43
Acetic and other volatile acids	·28
Fixed (lactic acid)	·76
Soluble non-nitrogenous extractive matters	6·11
Soluble mineral matters	2·23

INSOLUBLE IN WATER 29·64 PER CENT.

Insoluble albuminoids	4·44
Crude vegetable fibre	23·32
Insoluble mineral matters	1·88
	<hr/>
	100·00
Total nitrogen	1·26

*Containing nitrogen	·42
Volatile acids, calculated as acetic acid	·07
Non-volatile acids (lactic acid)	·04

NOTES ON BOOKS.

“REVUE UNIVERSELLE DES PROGRES DE LA FABRICATION DU SUCRE”
FOR THE YEAR 1883-84. By Fr. Sachs and Arin Le Docte. Brussels: E. Guyot. 1884. 2nd Part.

Is a continuation of the volume reviewed in the *Sugar Cane* of last October, and contains 160 pages of description of machines for evaporation and boiling down of beetroots, also the working of the Masse-Cuite, and the treatment of molasses. The various processes employed are clearly described, and the book is enriched with 3 plates and 110 figures. The authors regret that space has only allowed them to give a cursory sketch of sugar refining, which they promise to treat fully in the next year's issue; the publication being intended to be permanent.

Mr. K. Spenlé, engineer, 15, Boulevard de Strasburg, Paris, sends a copy of the “Sugar Manufacturers’ Pocket Diary and Calendar,” being a French translation of the little German work published by the well-known Dr. Stammer. The book contains ruled spaces, with printed headings, suitable for keeping a pocket record of the working of a sugar manufactory, and tables of every kind relating to saccharometry and polarization, worked out to the minutest fractions; also tables of densities and weights, proportion of circumference to superficial area, geometrical formulae, interest, postage, telegraph rates, the new French sugar law, several tables relating to productive power of the various soils and manures, and other agricultural memorandâ; forming altogether a complete *rade mecum* for the sugar manufacturer, especially of France.

MONTHLY LIST OF PATENTS.

Communicated by Mr. W. P. THOMPSON, C.E., M.S.C.I., Fel.Inst. P.A., Patent Agent, 6, Lord Street, Liverpool; and 323, High Holborn, London, W.C.

ENGLISH.

APPLICATIONS.

15587. ARTHUR HENDERSON, London. (A communication from abroad by Louis Aubert and Victor Giraud, Lyons.) *Improvements in the method of and in the process of transforming amylaceous and cellulose matters into saccharose or crystallizable sugar.* 26th November, 1884.

16079. EDMUND EDWARDS, London. (A communication from abroad by Gustav Frische, Schönaau.) *Improvements in the manufacture of beet sugar.* 6th December, 1884.

16297. HENRY E. NEWTON, London. (A communication from abroad by Albert Ludwig George Dehne, Halle-on-Saal.) *Improvements in plates for filter presses.* 11th December, 1884.

ABBRIDGED SPECIFICATIONS.

2344. JOHN HENRY JOHNSON, London. (A Communication from abroad by the Compagnie de Tives-Lille, Paris.) *Improvements in apparatus for mixing and elevating sugar in course of manufacture, or for analogous purposes.* 29th January, 1884. This apparatus consists essentially of a forcing apparatus or pump acting in combination with a pugging or mixing cylinder, which stirs and mixes the materials, and reduces them to a state fit to enable them to pass readily through the pump. Its use is to enable the *massecuite* from the vacuum pan or other material that is to be treated in the centrifugal machines or turbines, to be mixed and elevated with facility and economy, and may be either permanently fixed in the vicinity of the backs, or receptacles containing the said materials, or mounted on wheels, so as to enable it to be readily moved from place to place.

12782. WILLIAM RENWICK, Glasgow. *Improvements in vertical-roll sugar cane crushing mills.* 25th September, 1884. A box-like frame of cast-iron is provided for holding two or three rolls, such frame being formed with inverted sockets to receive the upper ends of posts of bamboo or wood which are let into the ground. The frame is also provided with a tray shaped to catch the juice expressed from the canes, and to deliver it from a spout formed at one side or other convenient part. In some modifications the frame is made in a single piece without joint or bolt, and when there are three rolls, the two outer ones rotate on stationary spindles, one of which is adjustable. In other modifications, suitable for either two or three rolls, the box-like frame is made with upper and lower parts, or front and back parts in separate pieces bolted together; and in such modifications the rolls may be fixed on their spindles, the journals of the spindles working against bearing blocks of brass or other suitable metal, and which are made adjustable.

307328. GEORGE M. PIERCE, Eagleville, Ohio. *Evaporating pan.* October 28th, 1884. This is an evaporating pan, preferably rectangular in form, and divided in the central part by a transverse partition into two general compartments, and the front compartment subdivided by partitions running lengthwise of the pan, and the rear compartment subdivided by partitions running crosswise of the pan, and the partitions each secured to the apex of a triangular corrugation, forming a part of the bottom of the partitions, provided with openings for the circulation of the liquid, and arranged alternately

on opposite sides of the compartments. The partitions are graduated in height in the front compartment, the highest partition being in the centre, and the partitions on either side decreasing in height toward the sides of the pan, and in the rear compartment the partitions increasing in height toward the rear of the compartment.

307594. ALOAH H. SAHN, Burlington, Vermont, Assignor to himself; GEORGE H. MORSE, WILLIAM A. CROMBIE, OTIS SHEPARD, EDWARD W. PECK, and J. S. PECK, all of same place. *Process of making lactose or milk-sugar*. November 4th, 1884. The inventor takes whey and adds to every 10,000 parts of same, carbonate of lime 10 parts, nitrate of potash 1 part, and carbonate of soda 1 part. He then heats it to 200° to coagulate the albuminoids, he separates them, and evaporates till a white cloudy precipitate of albuminous matters occurs, these he filters out, and continues the evaporation to dryness, the resulting lumps are put into a mill, like a coffee mill, and ground with a constant stream of iced water. This washes the impurities out, and the granular residue is dried, and is then ready for market.

307635. JAMES D. EDWARDS and LEON F. HAUTMAN, New Orleans, La. *Vacuum pan*. November 4th, 1884. A pair of vacuum pans are connected in series or double effect, with air-pumps in usual manner. These pans are formed each of a vertical cylinder projecting from the upper side of a horizontal cylinder, like an inverted T. In the horizontal cylinder is a second heating cylinder, with tubes open at each end to the outer cylinder. The space round the tubes is connected with a steam pipe, and is steam space, the end of the outer horizontal cylinder is made at a lid or door, so that by taking it off, the entire heating cylinder can be taken out intact. The upper vertical cylinder is fitted with one or more perforated horizontal rings of pipe, each of which can be connected with an exhaust chamber. The evaporated vapour of the first vacuum pan warms the second. The perforated ring tubes are used for scumming the air-pumps, being stopped when these are in use. The pressure then being greater in the vacuum pan than in the exhaust chamber, the scum, &c., rushes through the ring which is for the moment connected with the exhaust chamber, till the connection is again closed by a valve.

307702. FRANK M. AVERY, Brooklyn, New York. *Macerating machine*. November 4th, 1884. A fluted or rough drum revolves in a concave hemispherical trough placed eccentric to it, and of slightly larger diameter in such manner that the lip of the trough, which is met by the drum surface in revolving, is at some distance from the drum, while the other lip is close to the drum. Both drum and concave trough are held in place nearly against each other by springs, and racks and pinions are employed to regulate the distance between them. The material to be macerated is inserted between the lip and roll at the point where the roll and concave trough are

furthest apart, and said material is brought round between the two, and discharged at the other lip of the concave trough.

GERMAN.

ABRIDGMENTS.

25533. VAN HAESDONCK, Brussels. [*Cover and drying apparatus for sugar.* 12th July, 1883. The shapes for the sugar loaves rest upon screw spindles provided with discharge pipes, the female screws of which are fixed in a strong suitable stone table, and whose heads have a top in which the shapes are inserted, and by turning the screws are pressed against flanges of one of the discharge pipes placed above. The clearing and drying medium is introduced under pressure, the pressed out coloured syrup flows away through the screw holes.

25802. B. HÖLTKE, Prieborn, near Strehlen. *Apparatus for heating osmose water.* 13th May, 1883. The apparatus serves to maintain osmose water in repeated systematic use in three osmose apparatuses erected in three stories, one above another, at the same temperature as it had on passing any one of the apparatus. It consists of a round receiver fixed upon the entrance pipe of the second and third apparatus, divided by a partition, so that the two halves only communicate with one another at the bottom, and having a steam coil placed horizontally at the lower part of the apparatus.

25805. RUDOLF W. FARKAC, Warsaw. *Process for drawing off the raw syrup from the diffusion battery.* 6th June, 1883. In this process the finished raw juice of the diffusion battery is forced out, not as hitherto by aid of diluted juice or air, which causes in the first instance a dilution of juice, and in both cases a squeezing of the shreds against the sieve, and thereby render thorough circulation of air difficult; but after disconnecting the diffuser the syrup is simply drawn off for separation.

25874. FRITZ SCHEIBLER Burtscheid-Aix-la-Chapelle. *Improved method of making rectangular sugar blocks by aid of centrifugal machines.* 8th December, 1882. The improvement consists in making rectangular moulding boxes of elastic or flexible material, tinplate for example, which is only held together at one corner by a screw, consequently on loosing the screw one side opens, and so releases the sugar block.

Patentees of Inventions connected with the production, manufacture, and refining of sugar will find *The Sugar Cane* the best medium for their advertisements.

The Sugar Cane has a wide circulation among planters in all sugar producing countries, as well as among refiners, merchants, commission agents, and brokers, interested in the trade, at home and abroad.

TABLE SHOWING THE LOWEST PRICES OF SUGAR OF EACH MONTH OF 1884.

	January.	Feb.	March.	April.	May.	June.	July.	August.	Sept.	October.	Nov.	Dec.
Floating—Porto Rico, fair to good Refining...	18/6	18/-	16/6	16/-	15/-	14/6	13/-	12/6	12/-	11/6	12/-	11/-
" Cuba Centrifugals, 96% polarisation	20/6	0/3	19/-	17/6	17/-	16/3	16/-	15/3	14/6	14/-	14/-	13/-
" Cuba Muscovados, fair to good Refining	18/-	17/6	16/-	15/6	14/6	14/-	13/-	12/6	12/-	11/6	11/9	11/-
" Bahia, middling to good Brown, No. 7 to 8½	14/6	14/6	13/6	12/6	12/6	11/6	10/6	10/6	9/6	9 -	9/6	9/-
" Pernambuco, good to fine Brown...	17/6	17/-	15/3	14/6	14/	13/6	12/9	12/3	11/6	11/-	11/6	10/9
" Java, No. 14	21/6	21/-	20/-	18/6	18/-	17/3	16/9	15/9	15/-	14/6	15/-	13/9
Landed—Madras Cane Jagery	11/6	11/6	11/-	10/-	10 -	9/-	8/6	8/0	7/6	7/-	8/3	7/9
" Manila Cebu and Ilo Ilo	12/-	12/-	11/6	10/6	10/6	9/6	9/-	8/6	8/-	7/6	8/3	8/-
Paris Loaves, f.o.b.	23/6	23/-	23/-	21/6	21/6	20/-	19/9	19/3	18/6	17/6	17/6	17/-
Citlers'	25/-	25/-	24/-	23/6	23/-	22/-	22/-	21/6	20/-	19/-	18/9	18/-
Cato's Cubes	27/-	27/3	26/6	25/6	25/-	24/-	24/-	23/-	21/6	21/-	20/6	20/6
Austrian-German Beetroot, } 88% c f.o.b. }	17/4½	17/6	15/6	15/3	14/3	13/9	13/3	12/-	10/9	9/9	10/6	10/0
Stocks in U.K. end of month.	Tons. 253981	Tons. 262476	Tons. 270537	Tons. 270521	Tons. 288439	Tons. 288236	Tons. 293348	Tons. 285766	Tons. 273209	Tons. 243880	Tons. 243757	Tons. 244205

IMPORTS OF FOREIGN REFINED SUGAR.

The British Sugar Refiners' Committee furnish us with the following figures, giving the imports of foreign refined sugar for the month of November compared with the corresponding month of last year, and the average monthly imports for the year compared with those of 1882 and 1883, distinguishing the quantities of "Lumps and loaves" from "other sorts," and giving the separate imports from each country:—

	" LUMPS AND LOAVES. "						" OTHER SORTS. "						Including Crushed Loaf, Granulated, Crystallized, &c.						TOTAL.					
	Monthly Average.						Nov.,		Monthly Average.						Nov.,		Monthly Average.						Nov.,	
	1882.		1883.		1884.		Nov.,	1883.	1882.		1883.		1884.		Nov.,	1884.	1882.		1883.		1884.		Nov.,	1884.
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	
	France	3638	3538	2826	924	2818	948	1953	2477	1728	780	4723	5591	6015	4654	1704	7541	3285	4205	5463	5354	4463	3884	
Holland	1763	2352	3529	3556	2248	948	1522	1853	1934	1498	2215	3069	1461	2442	2570	4408	724	443	339	304	264	6		
Germany & Austria	513	588	506	645	815	67	101	124	151	90	153	1	195	520	4513	4549	61	131	49	68	16226			
Belgium	657	319	185	214	111	269	269	61	131	49	68	10343	10239	9487	6663	4860	94	226	1034	386	5	..		
United States	94	226	1034	386	5	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Other Countries ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Total	6665	7023	8083	6025	5997	4860	6663	9487	10343	10239	11525	13686	17570	16388	16226	16226	16226	16226	16226	16226	16226	16226	16226	

SUGAR STATISTICS—GREAT BRITAIN.

TO DECEMBER 20TH, 1884 AND 1883. IN THOUSANDS OF TONS, TO
THE NEAREST THOUSAND.

	STOCKS.		DELIVERIES.		IMPORTS.	
	1884.	1883.	1884.	1883.	1884.	1883.
London	83 ..	80	341 ..	380	339 ..	362
Liverpool ..	110 ..	72	267 ..	274	299 ..	279
Bristol	6 ..	7	53 ..	52	52 ..	55
Clyde	44 ..	59	232 ..	236	215 ..	249
Total ..	243	218	893	942	905	945
	Increase..	25	Decrease..	49	Decrease..	40

SUGAR STATISTICS—UNITED STATES.

(From Messrs. Willett & Hamlin's Circular, New York.)

FOR THE FOUR PRINCIPAL PORTS. IN THOUSANDS OF TONS, TO THE
NEAREST THOUSAND. FOR NOVEMBER, 1884 AND 1883.

	STOCKS.		DELIVERIES.		IMPORTS.	
	Dec. 1st,		For Nov.,		For Nov.,	
	1884.	1883.	1884.	1883.	1884.	1883.
New York	74 ..	38	42 ..	53	46 ..	52
Boston	21 ..	15	10 ..	14	9 ..	13
Philadelphia....	5 ..	2	6 ..	8	4 ..	9
Baltimore .....	..	..	..	..	..	..
Total.....	100	55	58	75	59	74
	Increase..	45	Decrease..	17	Decrease..	15
Total for the Year ..	..	..	961	845	1000	850

In the case of Baltimore, where nothing is put down, it means that the Stock, Imports, and Deliveries, do not exceed 500 tons in each case.

STOCKS OF SUGAR IN THE CHIEF MARKETS OF EUROPE ON THE
31ST OCTOBER, FOR THREE YEARS, IN THOUSANDS
OF TONS, TO THE NEAREST THOUSAND.

Great Britain.	France.	Holland	Germany (Zollverein)	Four other entrepôts.	TOTAL 1884.	TOTAL 1883.	TOTAL 1882.
241	162	15	118	17	552	416	371

CONSUMPTION OF SUGAR IN EUROPE FOR THREE YEARS, ENDING
31ST OCTOBER, IN THOUSANDS OF TONS, TO
NEAREST THOUSAND.

Great Britain.	France.	Holland	Germany (Zollverein)	Four other entrepôts.	TOTAL 1884.	TOTAL 1883.	TOTAL 1882.
1101	446	45	374	320	2286	2277	2072

ESTIMATED CROP OF BEET ROOT SUGAR ON THE CONTINENT OF EUROPE,
FOR THE ENSUING SEASON, COMPARED WITH THE ACTUAL CROPS
OF THE THREE PREVIOUS SEASONS.

(From *Licht's Monthly Circular.*)

	1884-85.	1883-84.	1882-83.	1881-82.
	Tons.	Tons.	Tons.	Tons.
France.....	375,000 ..	473,676 ..	423,194 ..	393,269
Germany(Zollverein).....	1,150,000 ..	986,403 ..	848,124 ..	644,775
Austro-Hungary....	525,000 ..	445,952 ..	473,002 ..	411,015
Russia and Poland ..	340,000 ..	310,000 ..	284,491 ..	308,799
Belgium	90,000 ..	106,586 ..	82,723 ..	73,136
Holland and other Countries.....	50,000 ..	40,000 ..	35,000 ..	30,000
Total.....	<u>2,530,000</u>	<u>2,362,617</u>	<u>2,146,534</u>	<u>1,860,994</u>

STATE AND PROSPECTS OF THE ENGLISH SUGAR MARKET.

We have to again report an unsatisfactory month—prices having further fallen from 9d. to 1s. 6d. per cwt., the drop being greater in cane kinds than in beet, Javas especially, which are now 13s. 9d. to 14s., against 15s. 3d. to 15s. 9d. a month ago. Beet 88% f.o.b., which at the end of November stood at 10s. 9d., is now down to 10s. If we take the twelve months, the fall in beet is 7s. 6d. per cwt., and in Javas 7s. 9d. per cwt., Cuba Centrifugals 7s. 6d. per cwt., Muscovados 7s. 6d. per cwt., Tate's Cubes also 7s. 6d. per cwt.

Taking 4s as the average loss upon the year, and one million of tons as the consumption, it represents a loss of £4,000,000, to sugar growers, in this market alone.

What the immediate future of prices will be, it is hard to say; at the present ruinous prices the chances, of course, are in favour of some improvement; much however depends upon the disposition and ability of holders; if the advice so strongly given by some German Sugar Journals, namely, to hold rather than sell at present prices, can be carried out, we shall soon see a decided advance.

On the 13th December, the imports for 1884 to date, as compared with the corresponding period of 1883, show a decrease of 40,062 tons, and the deliveries for the same period a decrease of 49,801 tons.

The imports of American refined for the eleven months ending November 30th, 1884, were 49,643 tons, against 5,720 tons for the corresponding period of 1883, and 2,145 tons in 1882.

The imports of refined from all countries for this period are 193,270 tons, against 150,546 tons in 1883, the increase on the American imports accounting for the difference.

The stocks on December 13 in the United Kingdom were 243,252 tons, against 218,088 tons in 1883 and 212,614 tons in 1882.


FLOATING.		Last Month.
Porto Rico, fair to good Refining	11/- to 11/8	against 12/- to 12/6.
Cuba Centrifugals, 96% polarization	13/- to 13/3	„ 14/3 to 14/6.
Cuba Muscovados, fair to good Refining ..	11/- to 11/6	„ 11/9 to 12/3.
Bahia, middling to good Brown, No. 7 to 8½	9/- to 10/6	„ 9/6 to 10/6.
Pernambuco, good to fine Brown	10/9 to 11/-	„ 11/6 to 12/-.
Java, No. 14	13/9 to 14/-	„ 15/3 to 15/9.
LANDED.		Last Month.
Madras Cane Jaggery	7/9 to 8/3, against	8/3 to 8/9.
Manilla Cebu and Ilo Ilo	8/- to 8/3	„ 8/3 to 8/9.
Paris Loaves, f.o.b.	17/- to 17/6	„ 17/6 to 18/-.
Titlers	18/- to 18/3	„ 18/9 to 19/-.
Tate's Cubes	20/6	„ 21/6
Austrian-German Beetroot, 88% f.o.b. ..	10/- to 10/3	„ 10/9 to 11/-.

THE SUGAR CANE.

No. 187.

FEBRUARY 2, 1885.

VOL. XVII.

 The writers alone are responsible for their statements.

N.B.—All communications to be addressed, and Cheques and P.O. Orders made payable to HENRY THORP, Ducie Chambers, 57, Market Street, Manchester.

For Scale of Charges for Advertisements, see page xi.

For Table of Contents, see opposite the last page of each Number.

The Spanish Minister of Foreign Affairs speaking in Congress on the 24th ultimo, said that the Government had no official notice of the intentions of the American Senate with respect to the treaty, and added “whatever be the fate of the convention, the situation of Cuba will not be damaged, for the Government is determined to make every sacrifice in order that the conditions of the island shall be improved, both economically and politically.”

Just as we are going to press, we have received a long and interesting letter, on refining of sugar in Cuba, from the Editor of the *Nueva Era*, occasioned by some comments of ours on an article upon this subject in that paper, which we reproduced in our December number, page 649. We regret that it has arrived too late for insertion this month, but we shall have pleasure in finding room for it in our next.

In the December *Sugar Cane*, pages 642 and 643, we gave a table showing the results of experiments in manuring cane fields, taken from *Timehiri*, the journal of the Royal Agricultural and Commercial Society of Guiana. The author, Mr. J. Owen Alexander, calls our attention to an error in the original. There are two headings, both “100 Canes.” The second should read—“100 Cane Juice.”

In anticipation of an early and further reduction of the sugar duties in the United States, which, whenever it takes place, must seriously affect the domestic sugar industry, a gentleman writes to the *Louisiana Sugar Bowl and Farm Planter*, advocating orange culture for the sugar belt of Louisiana. He says: "The demand for oranges is greater than the supply, and will continue so for all time. If all Florida and all Southern Louisiana were a solid grove the demand would not be satisfied. When properly managed there are few things that pay better."

The *Magdeburg Times* is informed that the draft of the law for prolonging the reduction of the export duty on sugar by 40pf, would probably be brought in towards the end of the session, and will be, not for two, but for one year. The report of the experts, who are travelling through the centres of the industry, to find out the special causes of the crisis, have first to be awaited. As this year's sugar beet cultivation will be everywhere reduced, in some parts as much as 50 per cent., it may be expected that its lessening our production, which forms one of the grounds of the crisis, will bring about an improvement in the position. Should this hope not be realized, the Government—who do not care to engage themselves for two years—will be able to bring out a further prolongation of the provisional law.

The stoppage of Herr Strauss, of Great Alsleben, one of the leading agriculturists and sugar manufacturers of that district, is another indication of the severity of the crisis through which the sugar industry in Germany is passing. Besides being the largest landowner in Saxony, Herr Strauss worked four sugar factories, of the most approved construction, and capable, it is stated, of turning out 1,000 tons of sugar per day. On the 6th of last month a meeting of the principal creditors was held at Magdeburg, when a loan of £100,000 was arranged, or at all events promised on certain conditions, for the continuance of the business in the factories. The assets are put down at £708,475, against liabilities stated to be £512,690; leaving a surplus of £185,785.

From the *Indian Agriculturist* we learn that a correspondence has lately passed between the Director of Revenue Settlement and Agriculture, Madras, and Messrs. F. J. V. Minchin Bros. and Co., on the subject of the cultivation of the sugar-cane and sorghum in that Presidency. The following statement supplied by that firm gives the approximate cost of cultivation in the Ganjam district:—

	Rs.	A.	P.
Rent of an acre or 5 burnams of land, at			
Rs. 2-8-0 per burnam	12	8	0
5½ burnams of seed-cane, at Rs. 7 per burnam ..	38	8	0
6½ do. of oil-cakes, at Rs. 5 per burnam ..	32	8	0
Manure for cane-field	5	0	0
Watering do.	15	0	0
Cleaning do.	12	0	0
Bamboo supports for cane	20	8	0
Total	138	0	0

From the above it appears that one burnam of cane yields seven bandies or 35 per acre = 420 cwts. or 21 tons, costing therefore Rs. 6-8 per ton on the field.

At page 73 we give an account, based upon Professor Church's report, of the beet sugar-making experiment now being made at Lavenham, taken from a recent issue of *The Times*. It appears that upon 640 acres under crop, upon 60 farms, the total produce turned out is about 6,840 tons, or rather over 10 tons to the acre. In some instances the yield reached 20 tons, in others 15 tons, and in a few the result was so poor as to give less than 5 tons per acre. On the majority of the farms the average was about 12 tons, and the average quantity of sugar in the roots reached 13 per cent., or 1½ tons of crystallizable sugar to the acre. We notice that a proposal is under consideration to fix the selling value of the crops in 1885, and afterwards, according to the sugar yield per acre—a very wise conclusion, if it can be carried out.

A correspondent in Shanghai asks us several questions relative to beet sugar cultivation; and whether beet, without the bounty,

can compete with cane. At pages 70 and 71 we have endeavoured to answer his questions. We have stated the cost of beet sugar to be 12s. 6d. per cwt., and have shown how we have arrived at this figure. If we add 1s. per cwt. for cost of freight and charges to port, it means 13s. 6d. f.o.b. Off this comes the bounty, say 2s. 6d., so that upon this basis, German sugars can be delivered f.o.b. at 11s. without loss. It is only since the middle of September that the price of beet sugar has been so low as 11s. In August the average price was 12s. 3d.; in July, 13s. 6d.; in June, 14s.; and in May, 15s. That our estimate of the cost, viz., 12s. 6d., is not put too high, is, we think, borne out by the severe losses which the sugar manufacturers in Germany are now sustaining.

In the *Produce Markets Review* of January 24, however, are some calculations, given with a view to show that beet sugar can be produced at a cost of 9s. per cwt., and can be delivered f.o.b. after adding the cost of freight and charges, and deducting the bounty, at 7s. 6d. per cwt. without loss. The writer alleges to base his figures upon certain statements contained in a very interesting letter which appeared in the *Journal des Fabricants de Sucre* of January 21. We wish the *Produce Markets Review* had given the letter *in extenso*. We are sorry that for want of space this month we are unable to give it, but we hope to do so next month.

The letter in question alludes to a report published by a French gentleman, who has been visiting the sugar centres of Germany and Austria. In it is shown the profit and loss account of a sugar factory for the year ending May, 1884. The yield in sugar was 11·77 per cent., and the profits were £15,485, after paying interest on preference shares, and the cost of keeping up the works and plant. The total turn out was 2,593 tons. The writer then, by way of making a comparison, modifies the figures so as to agree with present prices, and the result of his estimate for the year ending May, 1885, is a loss of £4,158. That is to say, the profits for the year ending May, 1884, showed £6 per ton (the prices during this period ranged from 21s. to 15s.), whereas the losses for the year ending May, 1885, are estimated at £1. 12s. per ton; and this in a factory which is able to obtain the high yield of 11·77 per cent.

WASTE IN THE MANUFACTURE OF SUGAR IN THE
WEST INDIES.

CENTRAL FACTORIES STRONGLY ADVOCATED.

Barbados, Dec. 29, 1884.

TO THE EDITOR OF THE "SUGAR CANE."

Sir,—I enclose two slips cut from the *Agricultural Reporter*, published in this island, the former of which gives a tabulated statement, taken from a communication made some years ago to your valuable publication by Mr. Robert Graham, of Ponce, Porto Rico.*

The object of these articles is to demonstrate, once more, that which should long ere now have been an established fact, recognised and admitted as a positive certainty beyond all cavil question and dispute, viz., that cane planters who make Muscovado sugars do not get, on an average, more than 60 per cent. of the saccharine which exists in the cane—that they lose, in absolute waste, two-fifths of the sugar contained in the plant, and that they then produce an impure, imperfect article, on which, moreover, after all the expenditure of time, trouble, and money employed to obtain it, a further loss of one-tenth of the shipped value is incurred through drainage. Yet it seems to be an impracticable task to convince many planters of these truths; they will not comprehend that they have in their own hands the effectual remedy for the evils of which they complain; they do not care to understand that beetroot sugar is *not* dependent for its existence upon being bolstered up by artificial supports, that it lives upon sufferance, and thrives in consequence of the utter want of all energy, and of the ignorance and obstinate adherence to routine, which are almost the never-failing characteristics of cane planters. Everyone knows that the beet contains a far smaller proportion of sugar in its juice than does the cane; and yet the beet is *industrially* nearly twice as productive as the cane. Is there any good reason for this? In the manufacture of beetroot sugar, the business is from the very outset subjected to and controlled by the strictest application of the soundest economic principles—the *division of labour*, in the complete separation of the agricultural work from the manufacturing process. The farmer, by having his attention exclusively fixed upon

* See *Sugar Cane*, September, 1876, page 486.

the object of improvement in the growing of the root, has succeeded in the selection of the best sugar producing varieties by the judicious use of the right fertilizers, by close study of the properties of the plant, and by more assiduous and careful cultivation in increasing the quality of his crops, and in raising the saccharine richness of their juices from 5 to 9-10 and even 12 per cent.

In the manufacturing branch of the business, by the aid of the best devised and most efficient machinery, and by the application of the resources of science, skill, and capital combined, the results obtained have reached to almost perfection. The utmost product which it is practicable to obtain is got from the raw material with ease and certainty, without waste and at the lowest cost.

In the making of beetroot sugar nothing is lost—everything is practically gained. Cane planters lose in sheer waste one-half of the gift which nature has placed in their hands—like the stupid bird of the desert, they run their heads into a bush, and think thus to escape the danger which presses at their heels. They persist in clinging to an untenable position; they think it enough to deny the existence of the plainest truths, and they howl after a fiscal protection which they never will have accorded to them.

The Agricultural Society of Barbados, in common with the most enlightened men in this community, are quite alert to the truth of the position, and they are anxious to avail themselves of the advantages of the Central Factory system, in which the wise and efficacious principle of the *division of labour* finds full application, and if they can succeed in carrying their wishes into execution the benefits to this island will be beyond all estimation.*

It is to be feared, however, that the most sensible and promising business-like propositions will fail to overcome the obstacles opposed by ignorant prejudices and stupid self sufficiency. When there are planters who to this day will still insist that they extract in the crushings, with their absurd antiquated windmills and their inefficient rattletrap toy engines, of so many *donkey* power, *all* the juice that it is possible to obtain from the cane (they get in reality 55 to 60 per cent.)—when there are men to be found, professing to know their business, who will assert that they get a yield from the cane of 10

* At page 72 we give a list of a series of resolutions adopted by the committee of this Society, which, if carried out, will in its opinion, largely benefit the Island.

per cent., and *even more*, in sugar, the fact being that they get 6, at the most $6\frac{1}{2}$, per cent.—when we read with amazement such a statement as that published in the *Barbados Globe*, and reproduced in the *Sugar Cane* for November last, page 566, “that sugar can be made and sold in Bridgetown at 10s. per cwt. with a profit of 5s. per cwt., (!) and * * * even better can be done, as 50 per cent. more can be obtained” (!!)—when we hear and see all this, what hope is there that any effort will succeed in converting from their errors such people, so unconscious of the facts of the case, so utterly devoid of common sense? Such people will meet their fate; they must be stamped out, and give place to better and more useful men.

I am, Sir,

Your most obedient servant,

A PLANTER OF 38 YEARS' EXPERIENCE.

COST OF MAKING MASCOVADO IN CUBA.

The following is taken from the *Havana Weekly Report* of January 10th, showing the present price and cost of Muscovado in Cuba:—

Several sales of Muscovadoes having been recently closed at $3\frac{1}{2}$ rs. arrobe, the following calculation has been published by the *Boletín Commercial* of this city:—

Value of one hhd. of 1,500 lbs. nett,	
at $3\frac{1}{2}$ rs. arrobe	\$ 24 37
Cost of production, freight and storage	„ 25 50
Planter's loss on each hhd.	\$ 1 13

According to one of our exchanges the difference between prices that will rule this year for Centrifugals and Muscovadoes will be smaller than during any of the previous ones, hardly going over $\frac{1}{2}$ @ 1 rial.

Taking the Spanish dollar @ 4s. the above shows a cost of production of 7s. $7\frac{1}{2}$ d. per cwt., against the selling price 7s. 4d. per cwt.

NOTES ON THE WORKING OF A SUGAR REFINERY.

By G. STADE, Hanover (Germany).

*(Continued from page 22.)**Product No. VI.*

The syrup thrown off from product No. V. was subjected to a slight osmose operation in rotary apparatus of the Mathée and Scheibler construction. German "parchment-paper" was the only kind used, and its action and durability were perfectly satisfactory.

The osmosed syrup was boiled down in vats like the product No. V., and centrifugalled at the end of eight to nine weeks.

Syrup for Osmosis :	Osmosed Syrup :	Waste Water :
73·38 % Brix.	29·35 % Brix.	4·26 % Brix.
48·80 „ sugar.	21·40 „ sugar.	1·34 „ sugar.
24·58 „ non-sugar.	7·95 „ non-sugar.	2·92 „ non-sugar.
66·50 „ purity.	72·91 „ purity.	31·45 „ purity.

The fill-mass obtained analysed :—

65·22 per cent.	sugar.
12·75 „	water.
22·03 „	non-sugar—
Of which : 7·79 ash.	

14·24 organic.

Calculated to 100 parts dry substance :	Which gives for 100 parts
74·75 sugar.	sugar :
25·25 non-sugar—	33·78 non-sugar—
Of which : 8·93 ash.	Of which : 11·94 ash.
16·32 organic.	21·84 organic.

The granular sugar obtained analysed :—

91·57 per cent.	sugar.
2·72 „	water.
5·71 „	non-sugar—
Of which : 2·36 ash.	

3·35 organic.

Calculated to 100 parts dry substance :	Which gives for 100 parts
94·13 sugar.	sugar :
5·87 non-sugar—	6·23 non-sugar—
Of which : 2·42 ash.	Of which : 2·57 ash.
3·45 organic.	3·66 organic.

Inspissated Osmose Waste Water.

The waste water was boiled down in steam apparatus to about 81 to 83° Brix; and of this, 81 tons = 1.40 per cent. of the charge, were obtained. Analysis as follows:—

42.13 per cent. sugar.
 16.48 „ water.
 41.39 „ non-sugar—
 Of which: 18.81 ash.

22.58 organic.

Calculated to 100 parts dry substance:	Which gives for 100 parts
50.44 sugar.	sugar:
49.56 non-sugar—	98.24 non-sugar—
Of which: 22.52 ash.	Of which: 44.64 ash.
27.04 organic.	53.60 organic.

The difference in the quotients yielded by the same charge under different concentrations was very marked. The inspissated waste water frequently crystallised perfectly if allowed to stand a long time, and a very considerable proportion of the crystals consisted, as has often been remarked before, of chloride of potassium.

The charge (mass) was sold at very fair prices to blacking and chemical manufacturers.

Syrup for sale.

The syrup from the centrifugals of this last product was also boiled down and disposed of mostly for manufacturing treacle. Of this 292.8 tons = 5.07 per cent. of the material worked up were obtained, the composition being as follows:—

56.61 per cent. sugar.
 16.74 „ water.
 26.65 „ non-sugar—
 Of which: 9.79 ash.

16.86 organic.

Calculated to 100 parts dry substance:	Which gives for 100 parts
67.99 sugar.	sugar:
32.01 non-sugar—	47.08 non-sugar—
Of which: 11.76 ash.	Of which: 17.30 ash.
20.25 organic.	29.79 organic.

Equal to 2.12 of sugar for one part of non-sugar, and 5.78 of sugar for one part of ash.

Before proceeding to state the net results, a few details respecting the bone black and coal consumed may be interesting.

Bone Black.

The products Nos. I. and II., together with the "clear" used for liquoring were filtered during the twelve months' operations through 5291 tons of bone black of medium-sized grain. This is equivalent to 91·6 of black to 100 raw sugar charge.

The average analysis for the year was:—Water, 1·93 per cent. ; Carbon, 6·23 per cent. ; Insoluble matter, 0·72 per cent. ; Carbonate of Lime, 8·16 per cent. ; Sulphate of Lime, 0·45 per cent. ; Sulphide of Calcium, 0·03 per cent. ; Undetermined, 82·48 per cent. Boiled with potash-ley the bone black produced only a very light yellow colour. After being used, the black, taken direct from the filters was boiled, without previous fermentation, with soda-ley or amononiacal-soda. For this purpose there was required 0·2 per cent. sodium oxide, reckoned on the weight of the dry char, when the filters had been used for clear coloured liquors and 0·4 per cent. when the liquors had been dark. Of oxy-muriatic acid, 0·5 per cent. ; calculated to hydrochloric acid, was used.

Coal.

The boilers were fired with Westphalian coal, the composition of which was:—Water, 1·9 per cent. ; Ash, 10·8 per cent. ; Volatile matter, 87·3 per cent. This can scarcely be called a good analysis. Of this coal, 8360 tons were used, the proportion in regard to raw sugar being 144·7 of coal to 100 parts.

Different reasons may be adduced for the use of such an exceedingly large quantity of firing material. The principal reason was the poor quality of the coal, but there was also the constant working-up afresh of the residual products, and the defective boiler and other apparatus.

Results Obtained.

The figures given below were obtained by weighing the products themselves, and are net, *i.e.*, without paper and string, in the case of loaves, and without packing, in the case of candy.

They are taken as calculated in estimates made at the works, which were drawn up with the greatest care.

During the twelve months in question, the following were the total quantities turned out:—

	Tons.	
Candy, white and half-white ..	975½ = 16·89 per cent.	} Of the material worked up.
„ yellow and dark yellow. 88	= 1·52 „	
Lump, loaves of 27½ lbs.	1424½ = 24·66 „	
„ crushed	1592 = 27·55 „	
„ pressed in cubes	1021¼ = 17·68 „	
Brown	118½ = 2·06 „	
Boiled-down osmose water	81 = 1·40 „	
Molasses	316¼ = 5·47 „	
Total	5617 = 97·23 „	

Deducting this total from the total of the material worked up, 5777 tons, we have a total loss of 160 tons = 2·77 per cent.

Extracting the results of the average analysis, in sugar, ash, and organic matters, so as to determine the loss in polarising and non-saccharine substances, we get:—

	Sugar. Tons.	Ash. Tons.	Organic Substance.. Tons.
Candy	1063½ ..	— ..	—
Lump	4037¾ ..	— ..	—
Brown	109¾ ..	2·1 ..	3·5
Osmose water	34 ..	15·2 ..	18·3
Molasses	179 ..	31·0 ..	53·3
Sent out from the refinery	5424 ..	48·3 ..	75·1
Raw sugar brought in	5568 ..	57·3 ..	59·0
Difference	-144 ..	-9·0 ..	+16·1

The loss in chemically pure sugar is therefore as follows:—

There were lost in the bone black, in 7575·2 tons.. 0·19 per cent.

„ in the waste sac- } in 6684·0 tons.. 0·28 „
charine water, }

Consequently, in the bone black 14·393 tons of sugar.

„ waste water..... 18·715 „

Elsewhere (not determined) 111·330 „

Or of this loss are:—

Determinable: in the bone black .. 9·965 } 22,925 per cent..
in waste water..... 12·960 }

Indeterminable 87·075 „

The loss amounts, calculated on the raw sugar, to..... 2·50%.

„ „ „ sugar of the worked- } 2·59%.
up material, to }

By means of the refining process, and especially the very complete filtration, 8·862 tons of ashes were removed from the works,—this cannot be considered a very large total. This observation agrees with the reports of Lippmann, and others. Considering the formation of glucose, which was frequently noticed during the year both in the case of first products and of by-products, it is not to be wondered at, and indeed it could hardly be otherwise than that an excess, though not a very important one, of 16·241 tons of organic non-saccharine substances should result.

If we take into account the 118·6 tons of powdered sugar (bastards) sold from the works, there will be a corresponding slight alteration in the figures of the result.

In the refinery in question, the yield was calculated according to certain factors which had been obtained by practice and experience, the manner of calculating however agrees, at least as regards the bringing out of the white sugar amounts, tolerably exactly with the French so-called “*Rendement au coefficient de 5.*”

There were obtained:—

5101·13 tons of refined sugar, to which add 97·90 tons from bastards.

81·00	„	osmose water,	„	„	3·32	„	„
316·20	„	molasses	„	„	13·30	„	„
160·00	„	loss	„	„	4·15	„	„

Altogether, there was obtained from the whole of the material worked-up:—

5199·29 tons refined sugar.

84·31 „ osmose water.

329·55 „ molasses.

164·15 „ loss.

Total... 5777·30 tons.

Calculated to percentage of the material worked up:—Refined sugar, 90 per cent.; Osmose water, 1·46 per cent.; Molasses 5·70 per cent.; Loss, 2·84 per cent.

As it was customary in the refinery to take the osmose water along with the molasses, we give these figures together, although the correctness of so doing may be doubted:—Refined sugar, 90 per cent.; Syrup, 7·16 per cent.; Loss, 2·84 per cent.

It now only remains to ascertain the results obtained from the sugar of the material worked up. It is very evident that these

figures alone can form the proper basis for deciding on the ultimate yield of the refinery.

Accordingly there were contained in:—

5199·29 tons of refined sugar of 100 per cent. . .	5199·29 tons sugar.
84·31 ,, osmose water, at 42·13 per cent. .	35·52 ,,
329·55 ,, molasses, at 56·61 per cent. . . .	186·56 ,,
<hr/>	
Total amount obtained . . .	5421·37 ,,
Contained in the raw sugar . .	5568·74 ,,
<hr/>	
Loss in polarising substance . .	147·37 ,,

Therefore, there was obtained or re-extracted from 100 parts of pure sugar:—93·366 per cent. refined sugar; 0·638 per cent. osmose water; 3·346 per cent. molasses; leaving 2·650 per cent. of loss.

Or, taking osmose water and molasses together as syrup:—Refined sugar, 93·366 per cent.; syrup, 3·984 per cent.; loss, 2·650 per cent.

Varying the figures by considering osmose water as a loss, we get:—Refined sugar, 93·366 per cent.; syrup, 3·346 per cent.; loss, 3·288 per cent.

PROTECTION AGAINST EARTHQUAKES.

Mr. Humphreys, in a recent letter to *The Times*, gives the following passage from Captain Basil Hall's "Journal written on the Coasts of Chili, Peru, and Mexico." Speaking of the great earthquake which destroyed the city of Copiapo, in Chili, in April, 1819, Captain Hall says:—

"In a situation such as this constantly exposed to these visitations the houses ought to be constructed on the principle of a ship, with timbers firmly bolted together, and as little as possible connected with the ground. If this were attended to there need never be the least danger; for at the worst it is not to be supposed that the motion of the earth can amount in degree to that of the waves of the sea. . . . In point of fact, the only houses that had stood the shocks were those built of the lightest materials and connected in the most superficial manner with the ground. All the rest, with deep foundations and thick walls, being riveted as it were to the surface, were exposed to the full violence of its movements."

On the occasion of an undulation caused by an earthquake a house well built upon foundations firmly fixed in the earth suffers in exactly the same way as a ship would do were it fastened to, instead of floating upon the surface of the sea.

CANE *versus* BEET.

The Perak Sugar Cultivation Company,
Shanghai, 26th November, 1884.

TO THE EDITOR OF THE "SUGAR CANE."

SIR,—Can you, or any of our correspondents, supply me with information on the following points?—

1.—What is the *average* weight of a beetroot crop from 1 acre of land?

2.—What is the average percentage of sugar derived from a given weight of beetroot?

3.—What labour is required for cultivating an acre of beetroot?

4.—How do the expenses of refining sugar from beetroot syrup and sugar cane syrup compare?

5.—Does sugar produced from beetroot—apart from bounty—compete with sugar from sugar cane? Is beetroot sugar produced in countries where there is no bounty?

Apologising for troubling you,

I remain, Sir,

Your obedient servant,

CHAS. J. DUDGEN, Secretary.

In reply to

Question 1.—In Germany the production of beetroot per acre was in 1876-77, 10 tons. In 1882-83, it rose to 14 tons per acre. See *Sugar Cane*, August, 1883, page 416.

Question 2.—In Germany the percentage of yield in sugar was in 1871-72 about 8½. In 1883-84 it was about 10½ per cent. See *Sugar Cane*, February, 1884, page 79.

In France they have hitherto grown a poorer root than in Germany, which, though it gives 16 tons to the acre, yields on an average only about 6 per cent. of sugar.* The high yield of

* In a recent number of the *Journal des Fabricants de Sucres*, the editor makes the statement that some works which have for 10 years not got more than the miserable figure of 4½ per cent., have this year sprung up to 10 per cent.

10½ per cent. in Germany is artificially stimulated by the levying the duty on the beetroot, which leads them to employ expensive processes for extracting the sugar from the molasses, which would probably not pay if it were not that they obtain the value of the duty, as well as of the sugar, on what they extract.

Question 3.—Labour required in raising beets is—

- (1) Preparing the land by deep ploughing, harrowing, and rolling (generally twice).
- (2) Drilling the seed.
- (3) Weeding continually from the time the seeds show above the ground till the roots are firmly established. This involves a large amount of labour.
- (4) Thinning and singling.
- (5) Pulling, cutting off heads, and storing in pits. This is also heavy work.

The total cost of cultivation in Germany may be set down at about £9 per acre.

We may add, though our correspondent does not include this in his questions, that the cost of manufacture of beetroot sugar is generally estimated to be on the average about 10s. per ton of roots, though some factories work for less. Taking £9 per acre, with an average yield of 12 tons to the acre, and 10s. per ton of roots as the cost of manufacturing the raw sugar, and 10 per cent. as the yield in sugar, that is 2 cwt. of sugar from every ton of roots, the total cost is 25s. per 2 cwt. sugar, or 12s. 6d. per cwt.

Question 4.—Taking raw beetroot and raw cane of equal quality, the cost of refining is the same, but the value of the product is higher from cane.

Question 5.—In Russia and Poland there are no bounties given, for the reason that they do not export sugars, and they are protected against outside competition. As to whether beet sugar, apart from bounty, can compete with cane, what we have said in our answer to question 3, as to the cost of producing beet sugar, answers this.—*Ed. S. C.*

CENTRAL FACTORY SYSTEM FOR BARBADOS.

The following series of resolutions, upon this subject, have been adopted by the Committee of the Agricultural Society of Barbados, and a copy sent to the proprietors of the different estates on the island:—

1. That central factories are desirable as the most practical means of rendering the manufacture of sugar in this island profitable.

2. That the factories should be erected by means of a loan, and the profits of each factory go into the hands of the proprietors of the estates for which such factory is erected.

3. That an application be made to the British Government, either to grant to the colony, for the purpose of carrying out this scheme, a loan of £750,000 sterling, at $3\frac{1}{2}$ per cent. per annum, or to assist the colony by an imperial guarantee in raising in the English market the required loan. Said loan to be obtained in such portions as may from time to time be required, and five years after each portion shall have been obtained, the principal to be redeemed, in 40 years, by equal annual instalments.

4. That the principal be a first lien on the central factories and upon the land of those estates which take part in the formation of the several factories, and be apportioned between the several estates in proportion to their several values.*

5. That interest be paid, or guaranteed by the island legislature, in the first instance, which shall recoup itself by means of a tax on the land of those estates which have taken part in the formation of the factories, and as soon as the factories are erected, and at work, then by a tax on the sugar produced at the factories.

6. That a committee be appointed to map out the island into districts, so as to determine the number of central factories required, the most suitable position for each factory, and the probable cost of erection.

7. That, wherever practicable, existing plant of machinery and buildings shall be utilized in carrying out the above system of central factories.

8. That a committee be appointed to enquire into the best means and the best machinery for extracting the maximum quantity of saccharine from the sugar cane, and report thereon, taking care that no means be recommended for this purpose which might involve a disproportionate increase in the cost of the manufacture of the saccharine matter into sugar.

The Agricultural Society now beg to submit the scheme to the consideration of the proprietary body of the colony, and in doing so express the belief that its adoption would be attended with a large measure of success.

* Although it is proposed that the loan shall be a first lien on the central factories and upon the lands of those plantations which take part in the formation of the several factories, the securities of mortgagees will not be injured, or impaired, as the value of each plantation will be considerably increased by the erection of the factory to which it will be attached, and each plantation will have a direct share, or interest, in such factory. And further, it is proposed by putting a tax upon every ton of sugar produced at the several factories to raise each year a sum sufficient to pay the annual interest on the loan, and provide a sinking fund for the payment of the principal.

BEET SUGAR MAKING IN ENGLAND.

THE LAVENHAM EXPERIMENT.

By the end of this month (January), or a few days later, the Lavenham Sugar Factory will be in full work. The delay which has precluded Messrs. Bolton and Partners (Limited) from taking any delivery of beet since the time of harvesting on the farms in October (which must have resulted in a certain loss of saccharine in the roots) has been due to the difficulty of fitting the building with the new machinery in time for the opening of the manufacturing season; and at the present moment it is only one piece of apparatus which is waited for—the whole machinery and plant being supplied by one of the greatest Continental firms, and constructed specially for the novel process now to be introduced. Apart from the exigencies of agriculture in discouraged corn-growing which may attract farmers to the chances of a new crop, and apart also from the disposition of the railways to accord easy rates of carriage to the factory, there are two special reasons for expecting, even in the face of an unparalleled glut of sugar production, a better fortune for the enterprise than fell to the experience of Mr. James Duncan at the Lavenham factory in 1869 to 1873—one being the progress which has been made in improvement of the beet itself, and the other the new and economical process of extracting and purifying the sugar. As we pointed out in March last year, the Sugar Association of the Zollverein have developed upon their experimental farm better varieties of beet and improved methods of cultivation, together producing roots richer in sugar and of a higher degree of purity from salts which interfere with the process of sugar crystallization; and by selection and breeding of the plant such an advance has been made also in France, notably by M. Vilmorin, of Paris, that growers can now secure a heavier weight of roots per acre compatibly with the most syrupy quality in the juice.

At the factory there will appear great changes readily observable to persons who were familiar with the operations of a dozen years ago. The loads of carrot-shaped roots (*minus* their green crowns cut off by the growers) will be weighed, but not subjected to any trimming by hand; unless, indeed, a forked and fangy root be dealt with now and then. For, as there will be no rapid rasp grating up the roots into a fine pulp, there is no need for carefully paring off the small rootlets and fibres which used to go away in the drain water—to the clogging and fouling of the brook which flows close beside the factory. And

this water-way will not be corrupted and made pestiferous with black char water which used to pour from the charcoal filters, as there will be no such filters. The water supply will be sufficient, seeing that much less will be required for condensing purposes than upon the old plan; and good water, in addition to that of the natural stream, has been provided by a couple of new wells. The beets, cleansed from adhering soil by the mechanical stirrers and brushes revolving in long vats or washers, will be elevated to the cutter—a machine resembling the root-cutter used by a shepherd—which slices the roots into finger-pieces; and these will be sent down a spout or trough which delivers a proper charge in turn into each of a series of circular vessels, placed in a ring form of arrangement for being conveniently charged by the spout as it swings round from the centre like a crane jib. By what is called the “diffusion” process, water of different temperatures at different stages flows continuously through all the vessels in turn, commencing as clear water with each spent charge of beet, and gradually enriching itself with the juice from partly exhausted charges in succession till it passes, as a rich solution of sugar, salts, and impurities, from the last vessel in which the maceration of fresh beet is begun. Each of the vessels is emptied in turn of the spent beet, which is carried to the pressing operation, where any sweet syrup remaining is made to exude—the pressed beet, however, still holding enough nutritive material to be an excellent fattening food for animals. This will be loaded upon carts fetching it away at the price of 6s. per ton; that is, half the price formerly paid for the pulp as it came from the bag-presses after the rasp. The solution from the beet will be boiled with lime, which is termed “defecation,” and the lime then precipitated by blowing carbonic-acid gas through the liquid. By the old process there would follow a second defecation, and then the tedious and expensive charcoal filtering. But it has been observed that the mineral earth strontia, as well as baryta, has the property of being able to seize and enter into combination with sugar in solution. Hence the liquor is boiled with strontia under pressure; a yellowish-white sucrate falls as a deposit to the bottom of the vessel; the water, still holding the salts and impurities though it has parted with the sugar, is run out through the precipitate of sucrate on a screen upon the bottom of the vessel, and this material is then treated with carbonic acid in water, which breaks it up, separates and recovers the strontia, and leaves the pure sugar in solution to be concentrated by vacuum pan and crystallized in the usual manner. The greatest gain of the new process however, is that, whereas by the old crystallization process the manufacturer lost some 20 per cent. of the saccharine matter of the beet juice, which from contamination of salts could not be crystallized and went away in the beet molasses—a product of low value—the strontia perfectly

clears all the sugar from these impurities in the way of crystallization, and extracts up to 95 or more per cent. of the sugar contained in the beet juice. The improvement has been very widely and rapidly adopted; and Messrs. Bolton, who have mines of strontia and other minerals at Fawler, in Oxfordshire, and at Mendip and Malago Vale, in Somersetshire, where they manufacture the natural sulphate of strontia into the carbonate and hydrate, send large quantities of this material to Germany, Austria, France, and some to Russia and Holland, for use in what is named "the Scheibler process." Baryta had been employed in France, but is objectionable on account of its poisonous properties, which are absent in strontia; and at the suggestion of Captain Sir Francis Bolton, M. Hippolyte Leplay, in France, patented an improved mode of using strontia, by which one operation accomplishes the same result that the "Scheibler" process effects in three. This method of Leplay is the one adopted at Lavenham. The process invented by Dr. Scheibler, of Berlin, is applied on the Continent to treating the molasses; but the process to be used at Lavenham will almost do away with molasses altogether, and the patent includes a cheap method for regenerating the strontia after use, which has been a very costly item in treating molasses.

One advantage of the new manufacture is that it is no longer a matter of prime importance that the percentage of salts in the roots should be small. Common salt, for instance, is an objectionable constituent in the analysis of sugar-beet, because its presence in large quantities betrays an inferior quantity of sugar; but potash in the juice is not objected to, and, indeed, as that article is worth about 24s. per cwt., the sale of the ash resulting will form a considerable item of profit. Messrs. Bolton and partners trust to meet the abnormally low price of sugar by the virtue of their process in both enhancing the yield of sugar obtained from the roots and in the various ways enumerated cheapening the cost of production. There is also this general consideration, that they possess important offsets against the operation of the German bounties in the fact that they will be able to supply sugar factories in England with strontia at a lower price than that for which the chemical can be obtained in Germany; while it is certain that our home factories will be able to market their sugar at a much cheaper rate than the German sugar can be transported to the same centres, Austrian and German sugar paying some 30s. to 35s. per ton freight, charges, and landing expenses before it reaches our refiners, and their produce again paying railway freight to the interior.

Coming now to the experience of English growers of sugar-beet in 1884, we have before us the carefully-considered and admirable report of Professor A. H. Church, M.A., F.C.S., late of the Royal Agricultural College, Cirencester. The extraordinary dryness of the spring

and summer told very unfavourably upon the germination or regular growth of the plant, and it was not expected that more than half a normal yield of roots would be secured on an average. However, upon 640 acres under the crop upon 60 farms, the total produce turned out to be about 6,850 tons, or over 10 tons per acre. In some instances the yield was as high as 20 tons, in many cases it exceeded 15 tons, and in a few the produce was so poor as to give less than five tons per acre. On a large proportion of the farms the average was about 12 tons per acre, and the average quantity of sugar in the roots reached about 13 per cent., corresponding to a production of one ton and a half of crystallizable sugar per acre. Professor Church cites the example of the Rev. R. K. Longden, who, at Brent Leigh, Lavenham, obtained 14 tons per acre of shapely small roots in drills 16 inches apart upon clean well-farmed land, a crop which so managed in an ordinary season would have given at least 20 to 25 tons per acre. Mr. G. H. Nunn, on 11 acres near Bury St. Edmunds, grew 18 tons per acre. Mr. Garrett Taylor, on 10 acres near Norwich, grew 14 tons per acre; the roots being 18 inches apart in the rows averaged, as they should do, less than 1½ lb. apiece, and were consequently very rich in saccharine, giving 14½ per cent. of sugar. Had the spaces been only nine inches between plant and plant there would have been double the number of plants and a marked increase of sugar per acre. Great stress is laid upon the importance of cleanness from weeds, especially couch-grass, of thick sowing, early thinning, careful singling, earthing up exposed parts of roots, cutting off any "bolted" or runaway stems, selecting the proper time for pulling the crop, and drawing without wounding the roots. And Professor Church recommends manuring with nitrate of soda as well as with superphosphate of lime, though farmyard dung ought to be applied to the crop preceding the sugar-beet. Where this has been used directly, especially in the spring, the roots are uneven in size, coarse in quality, and much fanged.

It appears that trial crops have been grown during the past year in Surrey, Berkshire, Oxfordshire, Middlesex, Northamptonshire, Lincolnshire, Staffordshire, Worcestershire, Warwickshire, Suffolk, Norfolk, Cambridgeshire, and Essex, also in Wexford in Ireland. The year's crops by no means offer a series of exceptionally well-grown and rich roots; yet in only four cases does the percentage of sugar fall below 11, in seven instances it is between 11 and 12, in eight cases between 12 and 13, in eight cases between 13 and 14, in seven cases between 14 and 15, and in three cases between 15 and 16 4 per cent. It is encouraging to hear that the highest percentages of sugar are not generally associated with the smallest yields per acre. Professor Church attributes most of the instances of only moderate success to the farmers treating sugar-beet as a fallow crop, and to

their neglecting the instructions given for management; and he adds an important note on the value of the beet (not the pulp from the factory, but the root itself) as cattle food. He says:—

“Several of the farmers who have grown these roots have been glad to use a part at least of the crops for feeding their stock; the results have been most satisfactory. Chemical analysis explains the superiority of sugar-beet over other roots for feeding purposes. While mangolds commonly contain 90 per cent. of water, and swedes and white turnips often more, sugar-beets will generally be found to average about 81 per cent. Thus a crop of sugar-beet, even though its gross weight may not be much more than one-half that of other kinds of roots, will contain quite as much solid nutritive matter. Moreover, it will present the further advantage of containing less of those saline matters which, without being of use in animal nutrition, tend, by their removal from the soil, to its exhaustion.”

It is necessary to state that Messrs. Bolton and Partners have requested their clients, the growers by contract, to defer taking any action toward sewing for the ensuing season until the close of February, when the experience gained by actual working in the factory will enable them to make important decisions for the future. An impression prevails that because of the unlooked-for fall in the sugar market the enterprising company will not be able to pay a good price for roots. But in any case they will certainly perform their contracts for the present crop; the terms, we understand, having been 20s. per ton for roots delivered at the time of taking up, and 22s. per ton when, as in the present case, the roots have been clamped. The proposal now under consideration is to fix the selling value of the crops of 1885 and future years according to the quantity of sugar yielded per acre; and it is probable that strict adherence to the scale will bring out some crops worth, if reckoned by weight of roots, up to 20s. and others down to perhaps 16s. per ton. Messrs. Bolton and the influential members of their company contemplate the eventual extension of the sugar-beet industry in many suitable districts of England if the commercial results of the Lavenham trial prove encouraging; and it is very well known that for depth and fertility of soil the Lavenham district has no especial advantage. Indeed, as shown by the comparative yielding of common mangolds, some tracts of land are capable of producing under similar arrangement one-third, or even one-half, more weight of roots per acre than can be grown on most part of the area which has been under sugar-beet in 1884.—*The Times*, January 24th, 1885.

ON THE EXTRACTION OF SUGAR FROM MEGASS AND FROM MOLASSES.

By T. H. EYDMAN, Soerabaia.

(Continued from page 639, December, 1884.)

SUGAR EXTRACTION FROM MEGASS.

In my considerations I proceed from the supposition that the cane contains 85 per cent. available juice, and that of this the mill gives us 68 per cent. The 32 per cent. of megass thus contains still 17 per cent. of juice, which I desire to gain by defecation, maceration, diffusion—or whatever you like to call it—from the megass.

This megass, crushed and torn as it comes from the mill, seems to me, and has always seemed to me, to be an excellent material for sugar extraction. Its spongy nature makes it swell up as soon as it is put into water, and so the liquid that must remove the sugar, penetrates into the very heart of it. A first condition is then that the megass be not compressed. This has been disregarded in the experiments hitherto made, and to this neglect of a main point is no doubt owing, in a great measure, the unsatisfactory results obtained.

My experiments, made in 1877 in the Factory Padjarakan on the defecation of megass, and in which I made this very point a main object, gave me very encouraging results.

I then still purposed to effect the extraction of the megass in a diffusion-battery, but with modified conical diffusors, which could be emptied in a moment by compressed air.

Circumstances did not allow me to revert to the subject subsequently; but I am still fully persuaded that, for us in Java, the megass must be the means of obtaining a higher yield of juice.

Not till a couple of years since was my attention attracted anew and for good to the subject, on reading a description of the *diffuseur continu* of Charles and Perret.

The *diffuseur continu* is intended by the inventors to replace the ordinary diffusion-battery; and by so doing to reduce a passably intricate process to a very great simplicity. To my visit to Europe do I owe the advantage of having seen that apparatus in operation: and the expectations I then had of it have become a conviction. That I stand not alone in this conviction is proved by the dictum, known to you, of Mr. H. D. Kramer, of Bandjardown, who accompanied me on my second inspection of this apparatus.

We saw it in operation at two factories, at one for the fourth year, in the other for the third. In neither of these factories was any other plant for the extraction of juice.

You will excuse my giving a description of the apparatus, it would

necessarily be very incomplete; for the rest the drawings are at your disposal, and I am ready to give any explanations that the curious may require.

It is enough to state that it works automatically and can be managed by one mandoer and a couple of coolies.

The process is as follows:—

The megass on coming from the first mill drops in at one extremity, and meets with a screw which propels it to the other extremity. On its way the megass meets with a great quantity of more or less diluted juice, about six or ten times its own weight.

The thickness of the juice is greatest at the point where the megass enters, and is nihil, or nearly so, at the spot where a Jacob's ladder takes up the defecated megass, to convey it to a second mill (which may be much smaller), where it is again pressed, especially for the purpose of recovering it for fuel.

If, in practice, it should appear that the water now expressed still contains sugar, it need not be lost according to my system. Of this hereafter.

In the factories where Mr. Kramer and I observed the operation of the *diffuseur continu* with beetroot cuttings, we were told that the dilution of the juice was about 40 per cent., and the pressed cuttings contained 0·43 per cent. of sugar.

The first figure I consider not attainable, but the second may be; so that assuming that 32 per cent. megass be again won from the cane, the loss of sugar in percentage of the cane would not amount to more than 0·14 per cent.

In my considerations, however, I assumed that the cane contains only 85 per cent. *available* juice. In reality the whole quantity of juice must be estimated at 88 per cent., and so I neglected before much more than the final loss in the megass will probably amount to.

Not so favourable, apparently, does the chance stand as to the dilution, and to anticipate all pessimists, I will assume—though under protest—that this will amount, not to 40, but to 80 per cent., of the juice obtained.

The total yield of juice will thus be

68	per cent.	from the cane	by the mill	
17	„	„	„	<i>diffuseur continu</i>
13·6	„	„	„	as dilution.

Total 98·6 per cent. from the cane.*

* Herr Louis Walkhoff, to whom I sent at his request a circumstantial description of my plans, wrote to me in consequence:—

“Die Idée, erst vorzupressen das Rohr und dadurch zur Maceration (Diffusion) vorzubereiten, ist superb.

Ich bitte mir seiner zeit von Java aus Nachricht, wie es praktisch geht. Ich bin überzeugt, dass das combinirte Verfahren bei Zuckerrohr rascher, und dichter Säfte giebt, als die Diffusion allein. Sie werden damit siegen; davon bin ich überzeugt.”

At the commencement of my contemplations, I stated that against the ordinary work of the mill, that requires an evaporation in the *triple effet* of 45 per cent. water of the cane weight, diffusion threatens to carry up this quantity to 91 per cent., that is the double.

On assuming the dilution of the juice from the megass with 80 per cent. (too high in my opinion), then with an equal yield of juice of 85 per cent. the proportion is as follows:—

With cane-cuttings and ordinary diffusion 119 per cent. of the cane.

With megass and *diffuseur continu* 98·6 per cent. of the cane; a difference of 20 per cent. in favour of the latter; coming (independently of the capacity of the *triple-effet*) to 12,353 kilogr. of water for every 1,000 piculs of crushed cane.

Starting from the following averages:

- 1°. 1,000 piculs of cane yield 160 piculs of dry megass.
- 2°. 1 picul of dry megass yields 180 kilogr. of steam.
- 3°. 1 kilo of steam evaporates 2·75 kilogr water in the *triple-effet*, then this makes a difference of 25 piculs of megass per 1000 piculs of cane, or 15·6 per cent. of all the megass obtained.

But with the *diffuseur continu*, too, the energy of the *triple-effet*, and thus the quantity of cane to be crushed daily is diminished, not indeed by 100 per cent., as with ordinary diffusion, but yet by about 78 per cent.

It is not otherwise, gentlemen, if you would confine yourselves to a greater yield of juice alone, then you must not only put up with a greater outlay for fuel, but its evaporating capacity must also be increased.

I think I can show you the means to obviate the first difficulty partially, the second well nigh entirely.

SUGAR EXTRACTION FROM MOLASSES.

In the *Indian Mercury* a paper will soon appear from my hand on the Extraction of Sugar from Molasses*. Referring you to that article for circumstantial details about the progress of this question of late years, I must at this moment confine my observations to a brief review of what I contemplate for Java. By a stupendous invention—stupendous in its import—of the engineer Carl Steffens, it has become possible to extract at least 95 per cent. of the sugar, which now goes to waste in the molasses.

For this purpose the molasses are diluted with water of a very low temperature, and under continuous cooling, mixed with a suitable quantity of lime. Within half an hour the lime is combined with all the sugar that the molasses contain, and is recovered in the form of sugar-lime, while about 5 per cent. sugar remains in solution, as the said combination is of difficult solution, but not quite insoluble in the liquor.

* In the Numbers June and July.

But this last 5 per cent. can also be advantageously recovered.

This sugar lime, which in its chemical composition differs materially from what was till very recently understood under that denomination, need not be decomposed like the other by introduction of carbonic acid.

Introduced into a weak solution of sugar, and heated, this new combination decomposes, the sugar dissolves, and the lime is precipitated as slaked lime.

In the liquor there remains very little lime in solution, so little that a slight addition of carbonic acid with the washed combustion products from the chimney is sufficient to eliminate this lime.

For the dilution of the molasses for the purpose of this process I can avail myself largely of very thin juice from the *diffuseur continu*; in the first place, of that proceeding from the after pressure of the megass, if it proves worth while.

The sugar-lime obtained every half hour, heated with the juice defecated in the *diffuseur continu* by my process, becomes at once a syrup: or, which comes to the same thing, this sugar-lime, mixed with the purified juice of the cane and of the megass together, makes this juice so much heavier that the total quantity of water that the *triple effet* has to evaporate is not greater than before.

Whether this will be also the case with the capacity of the vacuum pans is not to be said with certainty. This will depend a great deal on each respective factory.

It may, however, be well taken into account that, according to my system, the boiling and crystalizing of molasses falls away.

As soon as there are molasses they are "Steffened," and surely the prospect is rather attractive, not only to make 50 or 60 per cent. of sugar more, but also to effect this a couple of days after the last cane has been crushed.

Doubts are no doubt entertained of my assertion as to the possibility of extracting 13 to 15 per cent. of sugar instead of 9 to 10 per cent. from the cane.

Yet it is not to be gainsaid that the cane contains actually from 14 to 16 per cent. of sugar; and I am not aware of a single reasonable ground why the resources which I point out should disappoint my expectations.

That it would be *too good* is surely no reason.

It is exceedingly difficult to make an estimate of the expenses attending a trial of the two systems in Java.

If, then, I state any figures, I do so emphatically S. E. and O.

Roughly I consider 100,000 guilders* enough for the purchase of all the requisite machinery, costs of freight, transport and plant, provided the factory that offers itself for the trial have a small mill to press out the megass anew.

* Say £8,500.

The costs of exploitation, of which probably the fuel will bear the lion's share, I estimate very high at 30,000f. per annum (£2,600), for wages and expenses of lime and filter cloth are trifling.

It must not be forgotten that for both systems the material costs nothing. The megass I give back at least quite as good in quality, and for many it will be a great relief to be rid of all the bother of working the molasses, as practised hitherto.

The advantages of this alone compensate tenfold the few hundred guilders that the sale of the molasses produces, not to speak of the advantage of avoiding the noisome way which a part of our sugar has to traverse to reach a disgraceful goal as unavailable molasses.

Interest of invested capital, writing off for wear and tear, etc., are not included in these 30,000 guilders.

I will endeavour to make by approximation a calculation on these rough figures of the profits to be obtained.

I proceed from the supposition that a factory makes 40,000 piculs of sugar, which in toto cost 9,00f. per picul.

Sugar extracted.

In the old way.

40,000 to 9,00 360,000f.

Add to this the surplus, which may amount to 50 per cent., or

20,000 piculs costing :

In material Nihil.

In additional costs of exploitation per annum, say .. 30,000f.

In additional package and transport 10,000f.

Interest and writing off pro. mem.

Total, 60,000 piculs, costing 400,000f.

According to which rate the picul would come to 6,66f.*

Once more ; I am not aware that a single reasonable ground exists to doubt of the correctness of my statements and the anticipated results.

At any rate I can affirm that the greater expenses are rated high.

Yet, however certain I may be of the results, I can understand that where a capital of 100 thousand is concerned, there may be some scruple to enter upon the venture.

Therefore I have suggested the plan of furnishing a convincing proof by

* That if my plans succeed, *all the sugar* will be extracted as chief sugar speaks of itself. What we call the *RAFACTIEN* for mixed or for treacle sugars then cease ; and the mean number of the whole crop becomes higher. Yet it remains entirely in one's power to make the assortment fit for the European market ; quite as well as it is possible, if desired, to deliver one's whole crop in No. 20.

making a preliminary trial in Europe, the expenses of which are estimated at 15,000f.

1°. That the *diffuseur continu* of Charles and Perret answers the purpose in so far that it removes the megass supplied regularly, and exposes it without disturbance to the maceration in water.

2°. That Java syrup, worked according to the *procédé* Steffen, really yields in sugar what I anticipate it will.

This can only be proved by a practical fact.

I take upon myself to make the requisite trials in Europe, and place myself entirely at the disposal of those interested; but I bargain at the same time the condition, that a Committee of Experts be attached to me to give their judgment.

All those interested in the affair will be allowed the opportunity of attending, as far as it is practicable.

F. H. EYDMAN.

LIGNITE, OR BROWN COAL.

A specimen of Canadian lignite coal, taken from the deposits in the Souria Valley, Manitoba, has recently been submitted for Analysis to the Royal English School of Mines, with the following result:—

Carbon.. . . .	52·36 per cent.
Hydrogen.. . . .	3·52 „
Oxygen and Nitrogen	18·47 „
Sulphur	0·42 „
Ash	4·53 „
Water	20·70 „
	<hr/>
	100·00

The colour of the ash is buff. On being tested, the coal was found to ignite freely, and burn with a good flame, the heat being intense. The district in which this coal is found in large quantities is shortly to be opened up by a railway communication.

THE CHAIRMAN OF THE COLONIAL BANK, LIMITED, ON THE WEST INDIES.

On the 10th January last was held the half-yearly meeting of the Proprietors of the Colonial Bank, at the offices, in Bishopgate Street, E.C., Mr. H. H. Dobree in the chair.

The CHAIRMAN, in moving the adoption of the report, explained some of the causes which had led to the serious fall in the value of their shares during 1884.* He said :—

There had been a number of most desponding,—and, as he thought, over-desponding—letters from the proprietors in the West Indies and other sugar-producing countries, stating that the cultivation of cane sugar could never be carried on again at a profit; and those letters had naturally frightened persons as to the future of the bank.

As regarded its future, however, he would say that the West Indies had passed through, and had recovered from, quite as severe a crisis as they were now passing through, and they had been fairly prosperous, at least, for the last fifteen years.

The present great fall in the price of sugar was, in the main, caused by the unduly fostered production of beet—fostered unduly by bounties—and to such an extent had that production been encouraged, that the sugar had been forced down, owing to the enormous amount which had been produced beyond what the consumer could take, to as low as £10 per ton. That price was stated, by those who were fully competent to judge of the question, to be £5 per ton below the price for which sugar could be produced in any part of the world and under the most favourable circumstances. That was a state of things which could not last long. It was impossible that such an article as sugar could long be produced below its cost.

The beet interest was suffering quite as much as, if not more than, the cane sugar interest. In the cane sugar interest, especially in the West Indies, there was every prospect of a reciprocity treaty being concluded with the United States, which would enable the States to absorb the whole of the crops of the West Indies, and he had no doubt would be of immense advantage to the West Indies generally. It was believed by gentlemen who had some experience of the management of sugar estates, that although possibly in some of the smaller West India Islands cane might go out of cultivation, yet sugar could be produced as cheap, or even cheaper, in Demerara, Trinidad, and Barbados, as in any other part of the world. Another matter of some importance to them was, that the West Indies were not so entirely dependent upon the produce of the sugar cane as they were some ten years ago. Of course it was their great staple product, but there was a very large production of cocoa, spices, and fruit. The trade now springing up in fruit with the United States was very large indeed; and this all tended to make the West Indies, to some extent, independent of sugar.

* The price of the £100 shares, £30 paid, on January 1st, 1884, was 75 and on the 31st December, 1884, they had fallen to 42.

PROFESSOR CHURCH ON PERUVIAN GUANO.

The following remarks of Mr. A. H. Church, for many years Professor of Chemistry at the Royal Agricultural College, Cirencester, may be of use in fixing the position and showing the true value of Peruvian guano :—

Raw Peruvian guano, though chiefly consisting of the dung and urine of sea birds, contains also the altered remains of their dead bodies, and of the bodies of other marine animals. All these matters have been chemically changed, and now form a nearly uniform mixture, which, in the comparatively rainless districts of the South American shores and islands, loses but little of its value by lapse of time. It must, we suppose, be taken as a sound testimony to the manurial worth of guano that many preparations offered to farmers are dubbed with that name, whether they have or have not any right to it. Some of these things possess little or no power to increase the yield of the land, while those which are really capable of improving the crop usually have defects of one kind or another. Indeed, there has not yet been invented any mixed or artificial manure, however cleverly prepared, able to take the exact place of raw Peruvian guano. The cause of this will be seen when we have considered what is needed in a manure, and what are the properties which distinguish guano from its substitutes and imitations.

Let us look for a moment at the reasons which make it necessary to use manure at all. For in a state of nature we may observe stretches of grass and forest land producing, year after year, luxuriant growths of natural vegetation without any addition of the food of plants. But the fact is that agriculture makes much more severe demands upon the soil than does nature. Instead of everything drawn up from the soil, or taken in from the air by the plant, being restored, the farmer removes from the land altogether, in the crops and cattle and dairy produce which he sells, large quantities of the most valuable substances, such as nitrogen, phosphorus, and potassium. But this is not the only reason why agriculture must restore by art the losses of the soil. For the farmer is not content with the natural and moderate yield of his land—he insists upon thirty bushels of wheat where nature would give but fifteen. This second demand must be met by giving more food, and more of the right sort of food, to the plant. But, besides this removal of crops and this greatly increased production, the farmer dictates to the soil what kinds of plants it must support. Naturally other sorts of vegetation would have flourished upon his land, but he is not satisfied with a crowd of wild plants and weeds. He will grow but a very few plants, and these of a rather exacting sort. And he will persist in

growing the same succession of plants every four or six years, although nature often lets one race die out to replace it by another.

Now, to secure the agricultural—that is, the artificial results, of which we have just been speaking—the farmer must feed his land with liberality and skill. We will not say that farmyard manure, if used freely, will not answer his purpose, but farmyard manure is not always to be got, and when employed in large quantities year after year leaves in the ground an immense amount of unused nourishment; it must at least be supplemented by other manures. A manure as complete as farmyard manure, but more active and less bulky, is wanted; this want is supplied by raw guano.

It may be asked, “Why cannot the farmer get what he wants in artificial manures and mixtures?” For the agricultural chemist tells him that the three chief materials which he wants to feed his crops are nitrogen, phosphorus, and potassium, and that these may be bought most cheaply in nitrate of soda, coprolites, and kainite. Why then cannot these things be so treated, and so mixed with other materials necessary to make up their deficiencies as to become an artificial guano practically identical with that from Peru? Surely such a mixture will *analyse as well* as guano—so much nitrogen, so much phosphorus, so much potassium—and it will cost less. But the weakness of this argument lies in the fact that such artificial manures do not really present these necessary elements of plant food in the same forms as those which are found in guano. Moreover, they do not contain so large a variety of such compounds, nor are they associated with the same substances—substances of little direct use, it may be, to plants, but serving important indirect purposes. And, we may add, the mechanical or physical state of these artificial manures usually differs much from that of guano.

Our next argument in favour of guano is offered with some reserve, not because we suspect its soundness, but because it may easily be pushed too far. We have no unreasoning prejudice in favour of natural manures as against artificial, but we must give due weight to the fact that, in the perpetual circulation of matter which goes on in the world, the mineral kingdom sustains the vegetable, and the vegetable the animal. And we know, too, that animals during their life and after their death yield various matters, which, both in their chemical composition and their mechanical state, are particularly well fitted, as they gradually return to what may be called a mineral condition, to nourish plants. Briefly, the earth feeds the plant, the plant feeds the animal, the animal feeds the soil. Compared with the immense quantity of matter in the crust of the earth, this matter in circulation between the three kingdoms of nature is a mere trifle, but then it is going its regular round and doing its proper work, for which it is perfectly adapted in every way. Further, some of this matter in circulation,

including much valuable nitrogen and phosphorus, is every moment dropping out of circulation and is lost to agriculture, being carried into the rivers, and by the rivers to the sea. And so it is a fortunate circumstance that we are able by such a manure as guano, produced mainly by sea birds which feed on sea fish, to reclaim from the ocean a part of the lost treasures of the land.

And now we must hasten on to say something definite about the properties and composition of Guano itself. Let it be granted that we are dealing with an average quality, yielding on analysis fair proportions of nitrogen (expressed as ammonia), of phosphorus (expressed in the form of pure bone earth), of potash, and of so-called "organic matter." But the figures of an analysis do not suffice to explain the whole story of the efficacy of this manure. How is it that for centuries Guano alone has maintained the otherwise barren sands of these South American shores in a state of admirable fertility? We attribute this result, and similar results in other countries, not merely to the richness of this manure in plant food, but also to its very complex composition and its remarkable mechanical state. The soft light powder is not so fine as to be washed away through the soil, nor so coarse as to remain without becoming commingled with the earth. Its power of taking up and holding water allows those chemical changes to take place in it, without which its full power of nourishing the crop could not be developed. It is ever giving out carbonic acid gas, which makes the bone-earth of the manure dissolve, and so brings it into the state in which it can enter the roots. And, above all, its nitrogen and phosphorus exist in several forms, some at once ready for the use of plants, some soon becoming available, and the others being brought into activity later on. Thus, an average sample of Guano just analysed contained nitrogen in at least six different forms—namely, nitrates, nitrites, ammonia salts, uric acid, guanine, and a substance more complex than any of these. These several things become ready for the use of the growing crop in the order we have named, at each stage of the plant's growth something being prepared for it. This important property of Raw Guano may be illustrated by many familiar examples. Take one—the case of a sprouting wheat-grain. The embryo, germ, or chit, is there associated with an abundance of manurial elements—nitrogen, phosphorus, and potassium. Compounds containing these elements are crowded within and around the parts where growth begins to an extent three times as great as that in which they exist in the other parts of the grain. But they are not all at once ready for use, nor does each occur in but one form or condition. Step by step, as the substance of the sprouting grain decays, these nutritive matters become free and suffer change, yielding a variety of compounds, each serving some useful purpose. Much in the same way, the plant finds in guano materials which

can be turned to account exactly when they are needed. For this reason attempts to use nitrate of soda or sulphate of ammonia in place of the nitrogen compounds of raw guano do not fully succeed in actual farming practice. The influence of the manure is at once too intense and too fugitive. While it acts, it acts too strongly, and afterwards, when we want its help, we find that it has all been washed away. Sulphate of ammonia, though retained in the soil longer than nitrate of soda, has the same defects. As with the nitrogen, so with the phosphorus; there are present in raw guano phosphates of ammonia, of potash, of magnesia, and of lime, which like the above-named nitrogen compounds, come into use one after another, feeding the crop step by step as it needs help, and yet being kept about the roots till required. It should be added here that so great is the solubility of the more valuable parts of raw guano that mere rain water will at last extract 80 parts out of every 100 parts of its nitrogen, and nearly 50 out of every 100 of its phosphorus, even the undissolved residues of these two things finally becoming themselves soluble and therefore useful as the guano changes in the soil. This should be borne in mind in connection with the use of strong chemicals, like oil of vitriol, to make guano more soluble. This treatment not only impairs its admirable mechanical texture, but breaks up the very numerous and peculiar compounds upon which the progressive action of guano depends, reducing it in some measure to the common-place level of an ordinary artificial manure.

It would, however, be unreasonable to argue that there are no circumstances in which the addition of other substances to guano, or its chemical treatment, may be advisable. For fixing the ammonia of those guanos which are so rich in that ingredient, or are so constituted as to lose an appreciable amount of it by ordinary exposure during transit or unavoidable storage, the process of "dissolving" or "sulphating" possesses unmistakable value. When, too, we have to deal with hard and intractable guanos of the phosphatic class, their conversion into a peculiarly effective form of superphosphate is clearly desirable. The treatment of guano with sulphuric acid was patented by Dr. Richardson, of Newcastle, so long ago as 1859. It has done good service, but it always involves a large addition of non-manurial matter—about 1 ton of acid to 5 tons of guano is usually employed. Not infrequently the addition does not stop here, for sawdust, peat, and other useless substances too often follow in the wake of the oil of vitriol. Now-a-days the introduction of sulphate of ammonia is required in order to bring up the treated guano to the guaranteed strength. When raw Guanos contained nitrogen equal, not to 8 or 9 per cent. of ammonia as at present, but to 13, and occasionally even much higher proportions, then some method of preventing the escape of that constituent was often needed. An instance of this was furnished by a Peruvian guano imported in 1865, which lost by mere keeping for a few months in a corked bottle $9\frac{1}{2}$ per cent. of ammonia, the total originally present having been nearly 21.

For general agricultural use, commend us, on the whole, to raw Peruvian guano, neither weakened nor changed by admixture, nor "improved" by chemical treatment.

MR. SPENCER HOLLINGS ON MR. GILL'S PROCESS.

[As we inserted Mr. Gill's letter (November, 1884, *Sugar Cane*, page 602), it is only due to Mr. Hollings to insert this letter. The controversy, so far as *The Sugar Cane* is concerned, must now cease.—Ed. S. C.]

TO THE EDITOR OF "SUGAR CANE."

Montserrat, December, 1884.

SIR,

"And he said likewise,
That a lie which is half a truth is ever the blackest of lies,
That a lie which is all a lie may be met and fought with outright,
But a lie which is part a truth is a harder matter to fight."

—Tennyson.

It is with no desire to reopen the correspondence in your pages upon the merits or demerits of Gill's process of clarification, that I now address you, but simply to correct a misstatement of Mr. Gill's in his letter to you in last month's (November) *Sugar Cane*, in the first instance, and, secondly, to offer a word of warning to the members of that class to which I belong, viz., sugar planters, not to believe the statements put forth by Mr. Gill, that his system can add 50 per cent. to their sugar products, and 600 per cent. to the money value of their profits, as he asserts in his letter to the *Sugar Cane*, volume xii., page 245:—

Firstly.—In no part of my account of the trial of his process (see *Sugar Cane*, volume xiii., page 455) can he find any warrant for his statement (*Sugar Cane*, volume xv., pages 602-3) that "it pleased Mr. Hollings to legitimately imagine an accident of sufficient importance "to require the setting aside this clarified cane juice in a 'cooler,' "there to remain until the morning, when he found it in a state of "fermentation." My statement is that the clarification "did not "prove so satisfactory. My overseer and sugar boiler both thought "it (the juice) was getting very acid, and so did I; but we went "boldly on, relying on Mr. Gill's dictum that it would never ferment, "and thus it passed through all its stages into the *tayche*, where, in order "to test the matter at once, we brought it up to striking point, and discharged it into the coolers. The next morning the work of the day "before, as shown by the coolers, was pure glucose—not one particle "of grain in it." Human ingenuity could not more perversely mis-

quote a statement, or misapply facts, than to say, Mr. Hollings "said "that the cane juice was seemingly clarified, which is perfectly satisfactory," &c., &c.

His process has been tried by many competent men at their cost, and proved to be an utter failure. If he is honest in his conviction that no one has yet given it a fair trial, let him try it himself at *his own cost*, by way of a change. I challenge him to do so, or to produce reliable evidence of its commercial success anywhere. His statements are without the slightest foundation, as I know to my cost, having tried his process, fairly following his directions in the fullest and most complete manner (see particulars in *Sugar Cane*, volume xiii., pages 455 and 606.) Anyone reading these will see how disingenuous and unfair is the application made by Mr. Gill in his letter to *The Sugar Cane* of November, 1884. I was not a disbeliever, but, unfortunately, I was so far persuaded that his theory might be correct, as to be induced to pay Mr. Gill a large sum of money for a worthless apparatus, and to carry on an experiment *faithfully* on Mr. Gill's behalf, long after I had lost all faith in it myself (by which I was the loser of several tons of sugar), simply because I had promised him I would give it a *full* and complete trial, according to his directions, without varying them in the minutest detail. From this trial I am in a position to state, in the most positive manner, that Mr. Gill's process in no way arrests fermentation, as he declares, nor is the juice in any way beneficially acted upon by his nostrum; the sole advantage is derived from sand filtration, which is as old as the hills, and has long been pronounced upon by sugar planters as good to a certain extent, but in practice too liable (from the enormous surface exposed to the air) to induce fermentation in the juice. This matter has now been so thoroughly discussed in the pages of *The Sugar Cane* during the last fourteen years, that the heading "Gill's Process," or the variations rung thereon, is getting a little monotonous, and I think that until such time as Mr. Gill elects to prove his position by an experiment on a commercial scale, at his own cost, before reliable witnesses of known standing in the planting world, the pages of your valuable magazine are only cumbered by gratuitously advertising his scheme.

Yours faithfully,

J. SPENCER HOLLINGS.

NOTES ON BOOKS.

THE SCIENTIFIC AND LITERARY WORKS OF DR. T. L. PHIPSON, F.C.S., with a short biographical notice by C. J. Bouverie. pp. 32, 8vo. Wertheimer, Lea & Co., London. 1884.

We have great pleasure in recommending this brochure to the readers of the *Sugar Cane*, to the pages of which Dr. Phipson has been a frequent and valued contributor. Along with this sketch is given a list of the very numerous literary works which have proceeded from the able pen of this gentleman, who we trust may long be spared to continue his brilliant and eminently useful career. The father of Dr. Phipson appears to have possessed the same practical and original talents (though directed in a somewhat different channel) as his better known son, and some of the interesting facts related of him will perhaps be as new to most of our readers as they were to us. It seems that he was largely instrumental in introducing into this country the now universally diffused process of asphalt-paving, and that he materially assisted in the establishment of the first hydropathic institutions, and was, further, the first to call attention, in a letter to "*The Times*" dated January 21, 1852, to the advisability of forming Rifle Volunteer Corps.

The early days of Dr. Phipson were passed in Brussels, at which University he took the degrees of Bachelor and Doctor of Science, and was also elected Corresponding Member of the Royal Society of Medicine and Natural Science, after which he went to Paris to prosecute his studies. Here he was for some years engaged as assistant editor on the staff of the high-class scientific journal, "*Le Cosmos*," and gained the Haarlem prize for a paper on the very abstruse subject of "Catalytic Force," contributing also to the *Revue Photographique* and the *London Photographic News*, the *Chemical News*, and "*The Geologist*," and being elected a member of the Chemical Society of Paris. After a stay of four years in Paris, he came to London in 1860, and shortly after established a Laboratory of Analytical and Experimental Chemistry in that city, where for many years he carried on a most extensive analytical and consulting business; his practice not being confined to England, but extended to the West Indies, France, and Germany, and many other parts, the soils and productions of which countries he was constantly employed in examining, owing to his steadily increasing reputation. He was now elected Fellow of the *Chemical Society*, and, later, member of the General Committee of the *British Association*; edited for some years *The Scientific Review*, and continued to contribute to many

leading scientific journals of France and Belgium, and had conferred on him the membership of several foreign scientific societies.

His industry with the pen is almost unrivalled, and the list of his scientific, literary, and philosophical works would require several pages. It may suffice to enumerate the following :—

A volume on *Phosphorescence* (1862), the only work on this subject in the English language.

A small work on the Agricultural Chemistry of the Sugar Cane, which has reached its third edition, and has been translated into Spanish in Cuba.

A prize essay on Spectrum Analysis.

A paper on the *Application of certain Optical properties* of bodies, which obtained a gold medal at Brussels.

A prize essay on the *Use of Salt in Agriculture*, and another on the *Adulteration of Essential Oils*.

An extremely interesting work, *Familiar Letters on some Mysteries in Nature*, which it is said would of itself suffice to establish a literary reputation.

A treatise in French ; *Protocrista, ou la Science de la Création au point de vue de la Chimie et de la Physiologie*, is a very valuable contribution to the literature of the evolution theory, and is free from offensive materialism.

His writings have been freely translated into the principal European languages, and have been republished without leave in the United States.

A list of valuable scientific papers may be found on reference to the heading PHIPSON in the Catalogue of *Scientific Papers of the Royal Society*, vols. iv. and vii.

Not only has Dr. Phipson been a constant contributor to the practical discussion of many of the leading scientific questions of the day, but in his laboratory a considerable number of new substances have been discovered, and he has lately turned his attention again somewhat to medicine, being engaged in editing a medical publication entitled the *Journal of Medicine and Dosimetric Therapeutics*, which is of the highest interest.

As Dr. Phipson has not yet reached his 52nd year, we may fairly calculate on having for many years the benefit of his clear thought and deep philosophical, combined with highly practical knowledge.

SIR WILLIAM VERNON HARCOURT AND THE BOUNTY QUESTION.

In the November *Sugar Cane*, page 563, we alluded to a deputation to Sir Wm. V. Harcourt from Derby. Since then the following letter has been addressed to him, signed by thirteen of his constituents, "who sign for "themselves and fellow-workmen, and also on behalf of a very large number "of workmen, who from above causes have lost occupation, which for many "years they have enjoyed in works of long standing in Derby."

"Derby, 4th Dec., 1884.

"To the Right Hon. Sir W. V. HARCOURT, Bart., M.P. for Derby.

"Right Hon. Sir,—Following the favour you granted them in receiving a deputation of working men of this town on the subject of 'Foreign Sugar Bounties' on the occasion of your last visit to Derby in October last, and my communication to you dated 15th Jan., I am asked by the undersigned, and many others equally concerned, to convey to you the following remarks, and to crave your kind attention to same. We beg respectfully to call your attention to the present condition of the workmen employed in the engineering trade of Derby. Independent of the general causes for the present depression of trade, the engineering trade, have in addition to suffer from specific causes, which materially affect the interests of the workmen engaged in those trades. The continued decline in orders for machinery to work sugar plantations in the British West Indies and Demerara, &c., has for some time past been most seriously felt in our local engineering works. It does not appear that West Indian wants have been supplied by foreign made machinery, but that the cessation of orders for our local machinery and for British made sugar machinery generally is due to the absence of increase in the production of sugar in the West Indies, Demerara, &c.; in fact, to the prospect of great diminution in that production, as in the present state of things it is impossible for many of the planters to work their properties and live. It appears that this condition of things cannot be explained by any falling off in the consumption of sugar either in the United Kingdom or in America. On the contrary, the English and American consumption of sugar has rapidly increased. Yet, with these increasing markets for West Indian sugar, the production has been for a considerable period and continues in the condition just stated, and thus a most serious falling off in demand for sugar machinery has taken place.

"The fact that our West Indian production has not increased with the increasing consumption of sugar in England and America is attributable to two causes, viz.:—

"Firstly—The increase of beet sugar imports into the United Kingdom from the continent of Europe.

"Secondly—The heavy differential tariff imposed by America on British West Indian sugar.

"As regards the first stated cause there is no doubt of its injurious effects upon the engineering trades of Derby, Nottingham, Liverpool, Glasgow, Greenock, Bristol, Lincoln, London, and other places. Beet sugar is manufactured by foreign made machinery. It is notorious, too, that the displacement of British cane sugar is being effected by very arbitrary fiscal means in the form of export bounties. Such a gross violation of the Free Trade terms upon which this country consented to allow foreign goods to enter our markets demands effective measures of redress.

"The second stated cause is a serious disadvantage to the West Indian sugar production, tending to deprive the same of access to the large market of America, and thus again the subsidiary industry of manufacture of sugar machinery suffers from a cause eminently worthy of the attention of Her Majesty's Government and Parliament.

"Under these circumstances especial attention is most respectfully claimed from you to these specific causes, which, whether there be commercial depression or commercial activity, will operate always disadvantageously to the progress of the engineering trades of this town, and of other towns mentioned herein."

To this lengthy letter Sir William V. Harcourt replied on the 11th December last, "I will take care to attend to the matter referred to in your letter of the 4th inst."

PROTEST OF AMERICAN REFINERS AGAINST THE PROPOSED SPANISH-AMERICAN TREATY.

The following protest against the ratification of the Spanish-American Treaty has been forwarded to Washington.

NEW YORK, Dec. 17, 1884..

To the Honourable Senate of the United States, in Washington, D. C.

We, the undersigned merchants of the city of New York, respectfully protest against the ratification of the Spanish-American Treaty by your honourable body, for the following reasons:—

1. That it will at once reduce the revenue of the United States at least 30,000,000 dols. per annum without cheapening the cost of sugar to the consumer here, but giving that amount as a bounty to the growers of sugar in Cuba and Porto Rico.

2. That there is no adequate compensation for the great sacrifice made by this country, as the changes in the Cuban tariff are so arranged that they will not enable this country to compete with Europe in selling textile fabrics, while the increase in the export of other merchandise would be too trifling for consideration.

3. That discrimination in favour of the sugars of these two islands of Cuba and Porto Rico will virtually shut out the sugars produced in more distant countries, such as Brazil, Java, China, and the Spanish colonies of the Phillippine Islands, and in doing this take from our merchant marine a large and valuable part of their present employment.

Among the signatures attached are those of H. H. Swif and Co., Ira Bursley, Havemeyers and Elder, Hewlett and Torrance, Leaycraft and Co., F. O. Matthiessen and Weichers Sugar Refining Company, Bowring and Archibald, A. A. Low and Bros., Dick and Meyer, B. H. Howell, Son and Co., Thurber, Whyland and Co., Francis H. Leggett and Co., B. G. Arnold and Co., Snow and Burgess, L. Waterbury and Co., Brooklyn Sugar Refining Company, Havemeyer Sugar Refining Company, and North River Sugar Refining Company.—*American Grocer.*

MONTHLY LIST OF PATENTS.

Communicated by Mr. W. P. THOMPSON, C.E., M.S.C.I., Fel.Inst. P.A., Patent Agent, 6, Lord Street, Liverpool; and 323, High Holborn, London, W.C.

ENGLISH.

APPLICATIONS.

16424. E. EDWARDS, London. (A communication from abroad by E. Pechnik, Skrivan.) *Improvements in the process of refining sugar.* 13th December, 1884.

16914. HENRY H. LAKE, London. (A communication from abroad by R. H. Yale, U.S.) *Improvements in and relating to bagasse driers.* 24th December, 1884.

17092. GEORGE W. PARBURY, London. (A communication from abroad by G. Kottmann, New South Wales.) *Improvements in the process of and apparatus for treating megass for extracting sugar therefrom.* 31st December, 1884.

92. THOMAS DALE, London. *An improvement in double crushing, or five roller sugar cane mills.* 2nd January, 1885.

126. JOHN NORMAN, London. *Improvements in filter presses.* 3rd January, 1885.

353. ANDREW COOK, Glasgow. *Improvements in apparatus for cutting or reducing sugar canes or other vegetable substances.* 10th January, 1885.

500. FRANCIS B. WELCH, Manchester. *Improvements in the method of and apparatus for boiling sugar.* 14th January, 1885.

ABRIDGMENTS.

5050. CHARLES D. ABEL, London. (A communication from abroad by Theophile Rousselot, Martinique, West Indies.) *Improvements in sugar cane mills.* 30th December, 1876. The one set of rolls being driven by any suitable motar engine the requisite motion is imparted from it to the other set or sets by means of endless pitch chains passing over pitch wheels fixed on each end of the axes of the rolls, both the upper and lower roll of each set being driven by independent pitch chains, or the lower rolls being driven by pitch chains, and driving the upper rolls by gearing. By this means the requisite space may be obtained between the sets of rolls for the proper delivery of the megasse from the one set, and the subsequent moistening and feeding of the same into the next set. The usual receptacles for the megasse between the rolls are dispensed with, and in place thereof the rolls deliver the megasse on to inclined sieves or perforated plates, down which it slides, and at the lower end thereof it is received into buckets on endless travelling

chains, which raise it again and deliver it into a shoot leading to the next set of rolls. Perforated pipes are arranged over the travelling buckets, through which water is caused to flow on to the megasse contained in the latter, so as to moisten it before passing between the rolls. The axes of the pulleys over which the chain buckets pass have pitch wheels, also driven by pitch chains from the driving rolls.

6968. ARTHUR W. L. REDDIE, London. (Communicated by Monsieur Mariano Agrela, Paris.) *Improvements in furnaces for burning green sugar cane and similar moist substances.* 29th April, 1884. This furnace is composed of two auxiliary wings for burning ordinary fuel, and of a main furnace for burning bagasse. The object is that when the bagasse burns low, or is very damp, the auxiliary furnaces should assist it.

308407. JAMES F. FERGUSON and CHARLES C. POST, Burlington, Vermont. *Sugar Evaporator.* November 25th, 1884. This apparatus, difficult to explain without drawing, consists of a fire chamber and smoke flue with a fixed pan above both. The part of the pan over the fire chamber is divided into transverse sections with controlling gates. The heat below it is regulated by a series of sliding dampers; the remainder of the pan is divided into longitudinal sections. The sap enters at the hotter end and gradually travels to the cooler portion near the dummy where it crystallizes.

309029. PETER D. CORYELL and JOE H. CORYELL, Glidden, Carroll State of Iowa, U.S.A. *Sorghum Finisher.* December 9th, 1884. This apparatus consists of a furnace located immediately under a hot water or steam chamber, said chamber being extended and constructed to present at one end a primary boiling chamber, a finishing pan located on top of the water chamber, and a water supply tank, connected near its base with the hot water chamber, and a pipe extending from the upper part of the water chamber into the supply tank.

309096. ELIJAH F. RESER, Oronogo, co. Jasper, State of Missouri. *Combined furnace, boiler, and evaporating pans.* December 9th, 1884. This invention has relation to devices for manipulating sugar-bearing canes and the syrups thereof; and it consists, mainly, in the arrangement of an evaporating pan, with numerous partitions extending nearly across the pan from each side alternately, and a steam generator and heater of sufficient size and power to supply the steam for driving the cane crushing machine and heat for the evaporating pan.

GERMAN.

25875. FRIEDRICH KROEGER, Cologne. *Vessel for crystallizing candy sugar with movable frames for the crystallization threads.* 6th March, 1883. The vessel serves for the crystallization of a whole boiling instead of using a number of vessels, and is a fixture in the candy-room. It consists of a long box with inclined bottom, perforated sides, and a contrivance for letting off

the liquor at the lower end, in which several frames with horizontal or vertical threads can be placed. By the aid of a piece of iron bent into a rectangular form, adjustable, narrower or wider, and provided with female screw, the frames are pressed against the sides of the box, and by these means secured.

26115. ALBERT FESCA, Berlin, and JOSEPH MAHLICH, Giessmannsdorf. *Improvements in continuous acting deposit centrifugals.* 20th July, 1883. In order to preserve the liquid in the centrifugal at a uniform level, and guard against the formation of waves, which would hinder the deposit of solid bodies, such as starch from the liquid, ring segment sliding partition walls are fixed on the ordinary vertical partition walls of the centrifugal, which are easily withdrawn when the starch becomes visible.

26498. FR. RATH, Neuahaldensleben. *Evaporating apparatus for sugar juice and like liquids.* 16th June, 1883. The juice space and the steam space of evaporating apparatuses with horizontal as well as with vertical pipes is sectioned by vertical partition walls, arranged alternately in several divisions, communicating with one another, and the juice continuously and in such manner conducted towards and from the stream of steam, so that a continuous evaporation, regulated in view of the increasing concentration of the juice, and the decreasing temperature of the condensed steam, takes place; while by the apparatus at present in use there is equal concentration and equal temperature in all parts at the same time.

26427. J. E. BOIVIN and M. M. D. LOISEAU, Paris. *Improvements in the process of preparing sugar from molasses.* 30th June, 1883. By this process the sugar of the molasses is precipitated as carbonated saccharate of lime, a combination which contains about 48 parts sugar, 39 parts lime, and 18 parts carbonic acid washed with lime water, in which it is almost insoluble and decomposed by saturation with carbonic acid into carbonate of lime and sugar, which latter is treated in the usual manner. A mixture of lime with diluted molasses, from 12 to 15 degrees Baumé, is cooled down to 26 to 25 degrees Centigrade, it is treated with carbonic acid in an apparatus provided with vertical stirrer, while the heat which is developed by the formation of the carbonated saccharate of lime is removed by continuous cooling of the outer sides. By this means the mass becomes gradually thicker, so that in order to finish the treatment with carbonic acid, a second apparatus is required in which the mass is continuously mixed by aid of perforated plungers; the temperature is further reduced by cooling the plungers and cylinders to about 25 degrees Centigrade. The finished carbonated saccharate of lime is separated before being washed out by the aid of a press with perforated sieve into long thin threads, in which form and by continually renewing the lime water, of which an unlimited quantity can be used without harm, it can be washed out in a few hours.

26597. CARL SCHEIBLER, Berlin. *Improved process for separating sugar from molasses and syrups, by producing strontium saccharate at low temperatures.* 29th April, 1882. The mother lyes of the monostrontium saccharate are not as described in the principal patent converted into bistrontium saccharate, but instead of this by the addition of molasses and strontia in proper proportions produce monostrontium saccharate. This process is repeated say from six to eight times, until an excess of impurities accumulates in the last lye.

26923. BRUNSWICK MASCHINENBAU, Anstalt. *Extracting sugar from molasses by aid of lime.* 2nd February, 1883. For preparing the solution of saccharate of lime out of which the sugar is to be precipitated by aid of lime, and for precipitating the sugar itself from the saccharate of lime solutions, instead of using lime, as described in the principal patent, a saccharate of lime can be employed containing more than the monobasic equivalent of lime; for example, a solution can be employed from a previous operation. The saccharate of lime thus obtained contains a smaller quantity of lime than the one made use of. In order to extract all the sugar from the waste liquors, they are again treated in like manner with saccharate of lime.

26225. BRUNSWICK MASCHINENBAU, Anstalt. *Extraction of sugar from molasses by aid of lime.* 2nd February, 1883. By this process molasses liquids are made use of at such a low temperature to begin with, and are so strongly diluted that on the addition of lime they cannot attain a degree of heat over 35 degrees Centigrade.

ABRIDGMENTS.

26739. ALBERT SCHOLVEIN, Halle-on-Saale. *Improved process for purifying molasses, lime solutions, by osmose.* 6th June, 1883. The clear, dark, mother liquors remaining after the production of bibasic or tribasic saccharate of lime by heating diluted molasses with milk of lime, after filtering off the saccharate lime, are osmosed while still hot in the ordinary osmose apparatuses with water at 60 degrees, whereby the latter absorbs about twice as much salts and albuminous matter as remains behind in the molasses; on the other hand, the whole of the saccharate lime is said to remain behind, so the water contains no trace of the lime salts.

26803. IWAN GANS, Hamburg. *Purifying sugar juices, syrups, and molasses by the aid of liquid hydrate of alumina.* 15th August, 1883. The sugar juices, syrups, &c., are treated in the cold with 1 to 10 per cent. liquid hydrate of alumina, containing about $\frac{1}{2}$ per cent. alumina, and are separated by filtration from the solid transparent portions (which are combinations of alumina with non-saccharates). The liquid hydrate of alumina is prepared by dialysing a solution of freshly precipitated alumina in sulphate of alumina solution in an osmose apparatus. In order to prevent it from coagulating, which it would certainly do in a few days if not prevented,

it is treated with a very small quantity (ca. 0,001 p. Ct.) of tartaric acid solution.

26922. FRANZ POKARNY, Olmütz, Moravia. *Diffuser, with divided juice flow and central juice heating*. 3rd November, 1883. The aim of this diffuser is to concentrate the root juices as much as possible, and extract all the juice from the root raspings. To this end it is divided by a vertical hollow partition into two parts, which draws the compressed water successively from above to below, and *vice versa*, and can by letting steam into the hollow space of the partition be heated to any temperature.

26118. SELWIG and LANGE, Brunswick. *Separating drum for root washings*. 18th August, 1883. A rotating drum is fixed before the entrance of the wash drain, which is provided with a perforated casing through which the wash water flows off at its underneath part, and arranged in an inclined or screw-shaped form in its inner circumference; the water then flows through an inner cylinder casing with paddles on its exterior, which conveys the roots thus drawn in towards an outer plate from whence they fall into the conveyer. The roots in the drum can be kept in continuous movement by inclining its axis, or making the casing of a conical form.

26289. JOSEPH GÖRZ, Berlin. *Improved apparatus for continuous separation and saturation of root juices*. 25th May, 1883. The apparatus consists of a system of ascending and descending pipes connected together, which have, beginning from below, and then at fixed distances from one another, arrangements for letting in the milk of lime, strontia mash, and carbonic acid. The juice enters in order to aid the separation with lime through a valve in the first pipe, with a steam valve for heating the juice, a cock for admitting the milk of lime, and a nozzle system for thoroughly mixing the juice with the same. The juice ascends through a first pipe, and then descends through a second to a third pipe; here, in order to aid saturation, through the medium of a valve and a nozzle system, the carbonic acid is introduced. The steam which gathers in the upper parts of the apparatus, and which contains ammonia, finds an exit through a pipe towards absorption apparatuses of well known construction.

Patentees of Inventions connected with the production, manufacture, and refining of sugar will find *The Sugar Cane* the best medium for their advertisements.

The Sugar Cane has a wide circulation among planters in all sugar producing countries, as well as among refiners, merchants, commission agents, and brokers, interested in the trade, at home and abroad.

TABLE, SHOWING THE CONSUMPTION OR QUANTITY RETAINED FOR
MANUFACTURING PURPOSES, OF THE LEADING ARTICLES
OF COMMERCE, AND OTHER STATISTICS OF THE
UNITED KINGDOM.

Compiled by Francis Reid & Co., Brokers, Liverpool.

Year.	ESTIMATED POPULATION. 31st Dec.	SUGAR. Raw and Refined.		MOLASSES.		TEA.		COFFEE.	
		Tons.	Lbs. per Head.	Tons.	Lbs. per Head.	Lbs.	Per Head.	Lbs.	Per Head.
1865	30,000,000	545,781	40·75	28,692	1·90	97,921,944	3·26	30,748,349	1·02
1866	30,050,000	559,166	41·68	32,285	2·14	102,325,067	3·41	30,944,363	1·03
1867	30,200,000	593,358	44·01	20,186	2·41	111,057,705	3·68	31,567,760	1·05
1868	30,450,000	561,135	41·03	37,379	1·50	106,918,118	3·51	30,608,464	1·01
1869	30,750,000	583,369	42·17	37,088	2·75	111,889,118	3·64	29,109,113	0·94
1870	31,100,000	666,368	48·00	35,790	2·70	117,632,575	3·78	30,629,710	0·99
1871	31,500,000	720,201	49·93	34,181	2·50	123,529,642	3·92	31,010,645	0·98
1872	31,750,000	715,400	50·47	31,045	2·43	127,792,412	4·02	31,661,311	1·00
1873	32,000,000	786,033	55·02	28,220	2·19	132,022,155	4·12	32,330,928	1·01
1874	32,200,000	853,845	59·40	13,705	1·97	137,422,563	4·27	31,860,080	0·99
1875	32,400,000	942,703	65·17	37,375	0·96	145,458,120	4·36	32,526,256	1·01
1876	32,700,000	852,438	58·39	21,540	2·58	149,132,185	4·56	33,342,288	1·02
1877	33,000,000	834,692	56·66	13,910	1·47	151,275,237	4·58	32,830,224	0·99
1878	33,200,000	903,597	60·97	30,943	0·94	157,691,762	4·75	33,393,248	1·00
1879	33,500,000	914,742	61·13	36,057	2·09	160,652,187	4·80	34,696,256	1·04
1880	34,000,000	946,094	62·33	8,617	2·41	158,570,334	4·66	32,569,824	0·96
1881	35,300,000	989,208	62·77	12,672	0·57	160,225,789	4·54	31,943,408	0·90
1882	35,700,000	992,893	62·30	8,679	0·80	165,079,881	4·62	31,962,560	0·89
1883	36,000,000	1,066,464	66·36	17,079	0·54	170,812,697	4·74	32,448,080	0·90
1884	36,300,000	1,071,155	68·09	17,163	1·06	175,097,983	4·82	33,016,256	0·91

TABLE, SHOWING THE CONSUMPTION OR QUANTITY RETAINED FOR
MANUFACTURING PURPOSES, OF THE LEADING ARTICLES
OF COMMERCE, AND OTHER STATISTICS OF THE
UNITED KINGDOM.

Compiled by Francis Reid & Co., Brokers, Liverpool.

Year.	COCOA.		RICE.		TOBACCO.		TALLOW.		WINE.	
	Lbs.	Per Head.	Tons.	Lbs. per Head.	Lbs.	Per Head.	Tons.	Lbs. per Head.	Gallons.	Per Head.
1865	4,286,635	0·14	27,264	2·04	39,179,801	1·36	66,015	4·93	12,061,386	0·40
1866	4,606,997	0·15	48,726	3·63	40,995,161	1·36	64,518	4·81	13,327,916	0·44
1867	4,685,517	0·15	78,868	5·85	41,053,612	1·36	52,076	3·86	13,754,343	0·45
1868	5,730,223	0·19	134,729	9·91	41,280,001	1·36	57,163	4·02	15,151,741	0·50
1869	6,564,216	0·21	175,038	12·75	41,719,500	1·36	59,056	4·30	14,840,158	0·48
1870	6,943,109	0·21	92,802	6·72	41,717,012	1·34	77,879	5·32	15,168,321	0·50
1871	7,333,988	0·23	103,649	7·37	42,775,334	1·36	67,630	4·81	16,237,756	0·52
1872	7,853,165	0·25	189,796	13·39	43,948,427	1·38	60,644	4·28	16,873,955	0·53
1873	8,311,023	0·26	162,042	11·37	45,944,485	1·44	73,976	5·18	18,027,104	0·57
1874	8,863,579	0·28	144,010	10·02	45,787,816	1·40	57,575	4·01	17,284,385	0·54
1875	9,973,926	0·31	168,687	11·66	47,026,912	1·45	45,052	3·11	17,349,370	0·54
1876	10,428,478	0·32	152,742	10·46	47,681,858	1·46	63,579	4·36	18,671,089	0·57
1877	10,060,637	0·30	192,355	13·06	49,300,088	1·49	56,300	3·82	17,671,273	0·54
1878	9,980,162	0·30	112,669	7·60	47,969,263	1·44	42,347	2·86	16,272,295	0·49
1879	10,111,526	0·30	181,167	12·11	47,309,809	1·41	49,100	3·28	14,945,093	0·45
1880	10,566,159	0·31	217,219	14·31	48,261,775	1·42	54,808	3·61	15,852,335	0·47
1881	10,897,795	0·31	253,563	16·09	48,481,049	1·38	42,896	2·72	15,644,757	0·44
1882	11,996,853	0·34	212,035	13·30	49,055,938	1·37	44,993	2·82	14,431,282	0·40
1883	12,868,170	0·36	198,537	12·35	49,565,605	1·38	39,921	2·48	14,382,983	0·39
1884	13,963,891	0·38	158,152	9·76	50,772,513	1·40	45,720	2·82	14,075,625	0·39

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Year.	BRITISH & FOREIGN SPIRITS.		FOREIGN WOOL.		COTTON.		RAW SILK	
	Gallons.	Per Head.	Lbs.	Per Head.	Lbs.	Per Head.	Lbs.	Per Head.
1865	26,990,464	0·90	129,761,317	4·33	675,069,360	22·75	4,586,260	0·15
1866	29,769,868	0·99	172,785,201	5·75	988,177,568	32·88	3,488,711	0·12
1867	29,090,697	0·96	142,951,240	4·73	911,910,496	30·17	3,947,634	0·13
1868	28,610,658	0·94	147,673,844	4·85	1,005,463,536	33·02	4,105,882	0·13
1869	29,624,124	0·96	141,853,383	4·61	948,298,512	30·81	2,524,215	0·08
1870	31,707,609	1·02	166,819,579	5·36	1,099,751,092	35·36	3,638,782	0·17
1871	34,454,883	1·09	184,412,542	5·73	1,406,281,520	44·64	4,961,500	0·16
1872	33,618,968	1·06	165,397,521	5·21	1,142,620,304	36·30	3,949,890	0·12
1873	37,779,940	1·19	189,824,608	6·12	1,318,087,232	41·19	2,718,322	0·09
1874	40,510,613	1·26	194,438,122	6·04	1,427,984,768	44·35	3,201,596	0·10
1875	42,427,400	1·31	189,059,859	5·84	1,233,200,864	38·06	1,939,019	0·06
1876	41,796,449	1·28	213,065,992	6·51	1,291,165,568	39·48	2,943,904	0·09
1877	40,420,555	1·22	218,546,900	6·62	1,188,365,920	36·01	2,784,453	0·08
1878	40,722,383	1·23	196,195,351	5·90	1,194,310,320	35·97	2,333,393	0·07
1879	38,475,646	1·15	167,793,165	5·01	1,287,063,568	38·42	2,517,273	0·08
1880	35,764,464	1·05	222,945,958	6·56	1,404,697,616	41·31	2,733,676	0·08
1881	37,094,323	1·05	181,684,961	5·15	1,466,423,616	41·54	1,986,628	0·06
1882	36,916,312	1·03	220,513,147	6·18	1,504,107,696	42·13	2,458,970	0·07
1883	36,765,068	1·02	216,929,406	6·03	1,474,421,088	40·96	2,660,000	0·07
1884	36,634,194	1·01	242,662,342	6·66	1,485,037,792	40·91	4,142,730	0·11

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OF THE UNITED KINGDOM.

Compiled by Francis Reid & Co., Brokers, Liverpool.

Year.	TOTAL VALUE OF IMPORTATIONS.		TOTAL VALUE OF BRITISH AND IRISH PRODUCE EXPORTED.		RAILWAYS IN UNITED KINGDOM.		
	£	Per Head.	£	Per Head.	Capital Expended.	Per Head.	Nett Profit per cent.
1865	271,072,285	182/2	165,862,402	115/1	433,558,100	289/0	4.46
1866	295,290,274	197/2	188,827,785	125/8	463,746,800	318/8	4.29
1867	275,183,137	182/6	181,183,971	120/0	479,167,300	317/4	4.18
1868	294,460,214	194/0	179,463,644	118/0	486,893,400	319/10	4.13
1869	295,460,214	192/1	190,045,230	123/7	490,950,770	319/4	4.45
1870	303,257,493	195/0	199,586,822	128/1	504,381,000	324/4	4.49
1871	330,754,359	210/0	223,066,162	141/1	520,400,000	330/5	4.69
1872	353,375,740	222/7	255,961,609	161/3	537,285,640	338/5	4.83
1873	370,380,742	230/3	255,073,336	159/5	569,047,346	355/8	4.75
1874	368,435,432	228/11	239,436,207	148/9	578,320,308	359/2	4.80
1875	373,941,125	230/10	223,494,570	138/0	590,223,494	361/0	4.72
1876	375,093,771	229/5	200,639,204	122/6	658,214,776	402/7	4.17
1877	393,941,256	238/9	198,731,073	120/4	674,059,048	408/7	4.13
1878	366,059,610	220/6	192,804,334	116/2	698,545,154	420/10	4.25
1879	362,127,741	216/2	191,503,672	114/4	717,000,000	428/10	4.15
1880	411,210,056	241/2	222,810,526	131/1	728,317,000	432/4	4.38
1881	395,656,350	224/2	233,938,919	132/7	745,528,162	422/5	4.29
1882	412,001,683	230/10	241,477,156	135/3	750,000,000	420/2	4.32
1883	425,603,932	236/7	239,829,744	133/3	780,000,000	433/4	..
1884	389,774,549	214/9	232,927,575	128/4	790,000,000	435/3	..

Estimated.

TABLE, SHOWING THE CONSUMPTION OR QUANTITY RETAINED
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OF THE UNITED KINGDOM.

Compiled by Francis Reid & Co., Brokers, Liverpool.

Year.	DECLARED VALUE OF GOLD, SILVER, AND SPECIE.				BANK INTER- EST. Annual Average per cent.	INCOME TAX.	
	Imported.	Per Head.	Exported.	Per Head.		Nett Amount Assessed for Property and Profits.	Per Head.
	£		£				
1865	21,462,211	14/4	15,210,994	10/2	4.75	349,301,654	232/10
1866	34,287,139	22/9	21,970,687	14/5	6.90	364,430,553	248/6
1867	23,821,047	15/9	14,327,289	9/6	2.54	374,342,902	247/11
1868	24,852,595	16/4	20,220,014	13/3	2.10	386,542,366	253/11
1869	20,500,991	13/4	16,391,999	10/8	3.20	389,421,002	253/3
1870	29,455,668	18/11	18,334,450	12/2	3.04	398,222,811	256/1
1871	38,140,327	24/3	33,760,671	21/5	2.88	419,850,798	266/7
1872	29,505,319	18/7	30,335,861	19/1	4.10	434,802,952	271/9
1873	33,454,724	20/11	28,899,285	18/1	4.79	453,585,000	283/6
1874	30,380,268	18/10	22,853,593	14/2	3.70	481,002,000	298/9
1875	33,264,789	20/6	27,625,042	17/7	3.24	498,260,040	307/7
1876	37,057,353	22/8	29,464,082	18/0	2.61	503,676,578	308/7
1877	37,162,534	22/6	39,798,119	24/1	2.88	490,344,906	297/2
1878	32,421,490	19/6	26,686,546	16/1	3.77	493,598,158	297/4
1879	24,065,656	14/4	28,609,912	17/1	2.51	490,425,774	292/9
1880	16,287,964	9/7	18,889,503	11/1	2.76	486,077,028	285/11
1881	16,864,918	9/7	22,502,819	12/9	3.48	490,966,686	278/2
1882	23,620,579	13/3	20,989,258	11/9	4.16	534,158,462	282/5
1883	17,201,311	9/7	16,414,211	9/1	3.58	510,000,000	283/4
1884	20,321,853	11/2	21,999,222	12/1	2.95	530,000,000 Estimated.	292/0

THE IMPORTS OF SUGAR INTO THE UNITED KINGDOM.

According to the Board of Trade Returns, during 1884 and the four previous years, were as follows:—

	1884.	1883.	1882.	1881.	1880.
	Tons.	Tons.	Tons.	Tons.	Tons.
British West India	167,877	136,054	198,026	161,493	195,322
Foreign West India	23,043	16,150	31,831	22,250	32,040
Brazil	70,617	61,326	110,757	122,671	74,434
Peru	18,701	22,762	32,554	31,984	49,502
British East India	56,440	86,634	66,114	44,361	34,936
Mauritius	16,909	14,459	13,057	14,673	6,078
Java	162,683	169,803	148,176	98,633	} 146,856
Manilla	31,176	48,489	83,883	89,420	
China	6,182	9,644	16,973	15,169	17,991
Other Countries	29,201	32,679	23,064	22,025	31,102
Total Cane	581,828	598,000	724,435	622,679	588,261
Beetroot	400,794	419,852	265,840	310,693	261,307
Total Raw	982,622	1,017,852	990,275	933,372	849,568
Refined	213,334	164,273	138,452	139,180	151,715
Total Raw and Refined	1,195,956	1,182,125	1,128,727	1,072,552	1,001,283

EXPORTS.

Raw Sugar	24,148	35,222	13,617	13,750	15,687
Foreign Refined	11,188	7,289	6,327	7,743	6,252
British Refined	64,532	57,798	52,394	45,412	46,272
Total	99,868	100,309	72,338	66,905	70,211

HOME CONSUMPTION.

Raw and Refined	1,067,983	1,071,474	994,698	990,522	945,374
Population	36,000,000	35,700,000	35,350,000	35,000,000	34,650,000
Consumption per Head	66½ lb.	67¾ lb.	63 lb.	63¾ lb.	61¾ lb.

MACGREGOR & Co., 37, Mincing Lane, London, E.C.

WEEKLY STATEMENT OF COMPARATIVE

For the 52 Weeks of 1884,

German Beetroot 88 % Prompt, free on board.					French Crystals. No. 3, f.o.b.			West India. Good Brown.			Java afloat. No. 15 & 16.			
1884. 1883. 1882.					1884.	1883.	1882.	1884.	1883.	1882.	1884.	1883.	1882.	
Jan.	5.	18/3	19/6	19/9	22/-	22/3	24/3	26/-	17/-	18/6	21/-	22/3	24/-	26/3
	12.	17/9	17/10½	19/6	19/9	21/9	22/-	24/3	17/-	18/6	21/-	22/-	24/-	26/3
	19.	17/6	17/7½	19/4½	19/6	21/6	22/-	24/3	16/6	18/6	21/-	21/9	24/-	26/-
	26.	17/4½	17/6	19/3	19/4½	21/6	21/6	24/-	16/6	18/6	20/-	21/6	24/-	25/9
Feb.	2.	17/-	17/1½	19/-	21/-	21/3	21/4½	23/9	16/-	18/-	19/6	21/-	23/9	25/3
	9.	17/9	17/6	19/6	19/9	21/3	21/9	24/-	16/-	18/-	19/6	21/3	23/9	25/6
	16.	17/3	17/6	19/-	19/3	21/6	21/9	24/-	16/-	18/-	19/9	21/6	23/9	25/6
	23.	17/6	17/9	19/3	21/3	21/6	21/9	24/-	16/-	18/-	19/9	21/3	23/9	25/3
March	1.	17/6	17/4½	19/6	19/9	21/6	21/9	24/3	16/-	18/-	19/9	21/3	23/7½	25/6
	8.	17/3	17/-	20/6	20/9	21/6	21/9	24/9	16/-	18/9	20/-	21/3	24/3	25/9
	15.	16/9	20/9	21/-	21/6	21/9	21/6	25/-	15/6	19/3	20/3	20/9	25/3	25/6
	22.	16/6	21/3	20/10½	21/6	21/9	21/-	25/-	15/3	20/-	20/6	20/6	25/3	25/3
	29.	15/6	16/-	21/3	21/9	22/6	21/-	25/-	14/9	21/-	20/6	20/-	25/6	26/3
April	5.	15/4½	15/6	21/10½	21/6	22/6	20/6	25/-	14/6	21/-	20/6	20/-	25/6	26/-
	12.	15/9	21/-	21/3	23/3	21/9	20/-	25/-	14/6	20/6	21/6	19/6	25/3	26/6
	19.	15/6	15/3	21/6	23/-	21/9	19/6	25/-	14/6	20/6	21/3	19/6	25/3	26/6
	26.	15/3	15/-	21/3	21/6	23/-	19/-	25/-	14/-	20/-	21/6	18/3	25/1½	26/6
May	3.	14/6	14/1½	21/4½	21/6	23/-	18/6	25/-	13/-	20/-	21/6	17/6	25/3	26/6
	10.	13/9	14/3	21/3	21/6	23/-	19/-	25/-	14/-	20/-	21/-	18/6	25/3	26/6
	17.	15/6	15/-	21/3	21/6	23/-	19/3	25/-	14/-	20/-	21/-	18/9	25/3	26/3
	24.	15/6	16/3	21/6	21/9	23/-	19/6	25/3	14/-	20/-	21/3	19/3	25/-	26/3
	31.	15/-	14/9	21/6	21/9	23/-	19/3	25/3	13/6	20/-	21/-	19/-	25/1½	26/3
June	7.	14/6	21/6	22/9	23/-	18/9	25/3	27/6	13/3	20/-	21/6	18/6	25/-	26/-
	14.	13/9	14/-	21/3	22/6	22/9	18/-	25/3	12/6	19/6	21/-	17/6	24/6	25/9
	21.	14/3	14/-	21/-	21/3	22/-	18/-	25/-	12/9	19/6	20/6	17/6	24/6	25/9
	28.	13/9	13/7½	20/9	22/-	22/3	17/9	24/9	12/3	19/-	20/6	17/3	24/6	25/9
July	5.	13/6	13/9	20/9	21/-	22/-	17/9	24/9	12/-	19/-	20/6	17/3	24/6	25/9
	12.	14/-	20/4½	20/9	22/-	22/3	18/3	24/6	12/3	19/-	20/6	17/3	24/6	25/6
	19.	13/7½	13/9	20/7½	20/9	22/-	17/6	24/6	12/3	19/-	20/3	17/3	24/6	25/6
	26.	13/6	13/3	20/7½	20/9	22/6	17/6	24/9	12/-	19/-	20/-	17/-	24/3	25/6
Aug.	2.	13/3	13/1½	20/7½	20/9	22/6	17/6	24/9	11/9	19/-	20/-	17/-	24/3	25/6
	9.	12/9	12/7½	20/9	21/-	22/6	17/-	24/9	11/6	19/-	20/-	16/9	24/3	25/9
	16.	12/-	11/6	20/9	21/-	22/6	16/6	24/9	10/9	19/-	20/-	16/3	24/-	26/-
	23.	12/-	12/3	20/6	20/9	22/6	16/6	24/9	11/-	19/-	21/-	16/3	24/-	26/6
	30.	12/9	12/6	20/6	20/9	22/6	16/9	24/6	12/6	19/-	21/-	16/3	24/-	26/6
Sept.	6.	12/4½	12/6	20/3	20/6	22/6	16/6	24/6	12/-	18/9	20/6	16/-	24/-	26/6
	13.	12/6	12/3	20/9	20/9	22/6	16/6	24/9	11/6	19/3	20/-	16/-	24/7½	26/6
	20.	11/-	11/6	20/6	20/9	21/9	16/-	24/6	10/6	19/-	20/-	15/6	24/6	25/9
	27.	11/-	10/9	20/3	20/6	21/9	15/6	24/6	10/-	19/-	20/3	15/-	24/3	25/9
Oct.	4.	9/10½	10/-	20/-	21/9	21/9	14/9	24/-	9/9	19/-	20/6	14/6	21/3	25/9
	11.	10/7½	10/9	19/9	19/10½	21/3	14/6	24/-	10/6	19/-	20/6	14/6	21/3	25/3
	18.	11/9	11/3	19/3	19/6	21/3	15/-	23/6	11/6	19/3	20/-	15/6	24/-	25/3
	25.	12/6	12/-	19/1½	19/3	20/9	16/-	23/3	12/-	19/6	20/-	16/3	23/9	25/-
	31.	11/6	11/4½	19/-	20/7½	21/9	15/6	23/-	11/6	19/6	19/6	16/-	23/7½	25/-
Nov.	7.	11/-	18/10½	19/-	20/3	20/3	15/3	23/-	11/-	19/6	19/6	15/9	23/6	25/-
	14.	10/-	18/7½	18/9	19/9	20/-	15/-	23/-	11/-	19/6	18/6	15/6	23/6	24/9
	21.	10/7½	18/6	18/9	19/9	20/-	14/6	22/9	10/6	18/6	18/6	15/-	23/3	24/9
	28.	10/4½	18/6	18/9	19/9	20/-	14/6	22/7½	10/6	18/-	18/-	15/-	23/1½	24/9
Dec.	5.	10/3	18/4½	18/6	19/9	19/9	14/6	22/6	10/3	18/-	18/-	14/6	23/-	24/6
	12.	10/-	18/3	18/6	19/9	19/9	14/3	22/6	10/-	17/6	18/6	14/3	22/9	24/3
	19.	10/-	18/3	18/6	19/9	19/9	14/3	22/3	9/9	17/-	18/6	13/9	22/9	24/-
	26.	10/-	18/-	18/-	19/9	19/9	14/3	22/-	9/9	17/-	18/6	13/9	22/3	24/-

PRICES OF RAW AND REFINED SUGAR

compared with those of 1883 and 1882.

		Tate's Cubes.			Martineau's Titlers.			Say's Loaves, f.o.b.			Lebandy Loaves, f.o.b.		
		1884.	1883.	1882.	1884.	1883.	1882.	1884.	1883.	1882.	1884.	1883.	1882.
Jan.	5..	27/9	31/-	33/-	25/-	25/6	28/6	31/6	31/9	24/-	27/3	29/6	29/-
	12..	28/-	31/-	32/6	25/6		28/9	31/9		24/-	27/3	29/3	28/9
	19..	27/6	31/-	32/-	25/3		28/6	31/-	31/3	—	27/3	29/-	28/6
	26..	27/-	31/-	32/-	25/-	25/3	28/6	31/-	31/3	—	27/3	28/9	28/3
Feb.	2	27/-	30/6	31/6	25/-		28/-	28/3	30/6	31/-	—	26/6	28/3
	9..	27/6	31/6	31/-	25/-		28/-	28/6	30/9	—	26/6	29/-	28/-
	16..	27/6	30/6	31/9	25/-	25/3	28/3	31/-		23/6	26/6	29/-	28/6
	23..	27/3	30/6	31/6	25/-		28/-	28/3	30/9	23/6	26/6	28/9	28/-
March	1..	27/-	31/-	31/6	25/-		28/3	28/6	30/9	23/6	26/9	28/6	28/-
	8..	26/6	31/6	31/6	25/-		29/-		31/-	—	27/-	28/9	28/3
	15..	26/6	32/-	31/6	24/6	25/-	29/-	29/6	30/9	—	27/6	29/6	28/6
	22..	26/6	32/-	31/6	24/6		29/6		31/6	—	27/6	28/9	28/3
April	5..	26/6	32/6	31/9	24/-		29/6	29/9	31/6	—	27/9	29/-	28/6
	12..	26/-	31/6	32/6	24/-		29/-	29/3	32/-	—	27/6	29/-	28/9
	19..	26/-	31/6	32/6	24/-		29/-	29/3	31/9	—	27/6	29/-	28/6
	26..	25/6	31/6	32/-	23/6		28/6	29/-	31/6	22/-	27/-	29/-	28/6
May	3..	25/-	31/9	32/3	23/-	23/6	29/-		31/6	21/6	27/-	29/3	28/6
	10..	25/9	31/6	32/-	23/6	24/-	28/6	29/-	31/9	22/-	27/-	—	28/6
	17..	26/3	31/6	32/-	23/9	24/-	28/9	29/-	31/9	22/3	27/3	—	28/3
	24..	25/-	31/6	32/-	23/9	24/-	29/-	29/3	31/9	22/-	27/3	29/-	28/6
June	7..	25/-	30/6	33/6	23/3	23/6	28/6	28/9	32/6	21/6	27/-	—	28/3
	14..	24/6	30/6	33/6	23/6		28/6	28/9	32/-	21/6	—	29/6	28/3
	21..	24/6	29/9	32/6	23/-		28/6		31/9	21/-	26/6	29/6	28/6
	28..	24/-	30/-	32/6	22/-	22/6	28/3	28/6	31/9	—	26/6	29/6	29/-
July	5..	24/-	30/-	32/6	21/9	22/-	28/6		31/6	20/6	26/3	29/9	29/3
	12..	24/-	29/9	32/6	22/-		28/6		31/9	20/3	—	29/6	29/-
	19..	24/-	30/-	32/6	22/6		28/6	29/-	31/9	20/3	26/6	29/3	29/-
	26..	24/-	30/3	32/6	22/6		28/6	29/-	31/9	20/3	26/9	29/6	29/-
Aug.	2..	23/9	30/6	32/6	22/3	22/6	28/9	29/-	31/6	20/3	27/-	29/6	29/-
	9..	23/9	30/6	32/6	22/-	22/6	29/-	29/3	31/3	—	—	29/6	28/6
	16..	23/6	30/-	32/6	22/-		28/6	28/9	31/3	—	27/-	29/-	28/6
	23..	23/-	31/-	32/-	21/6		28/-	28/3	31/-	20/-	—	29/-	28/6
Sept.	30..	23/6	29/6	32/-	21/6	21/9	28/-	28/3	31/6	19/9	28/6	29/-	28/6
	6..	23/-	29/6	32/-	21/6		28/-		31/3	19/9	26/3	29/3	28/9
	13..	22/9	29/6	32/-	21/-		28/-	28/3	31/-	19/9	27/-	29/-	28/6
	20..	22/-	29/6	31/6	20/6		28/-		30/6	19/9	26/6	29/3	28/6
Oct.	27..	21/6	29/6	31/6	19/6	20/-	28/-		30/6	19/-	26/6	29/-	28/6
	4	21/-	29/-	32/-	19/-		27/9	28/-	30/6	18/6	26/3	29/-	28/6
	11..	21/3	29/-	31/6	18/6	19/-	27/3	27/6	30/6	18/-	—	29/-	28/6
	18..	21/6	29/-	31/6	18/-	19/6	27/-	27/6	30/3	18/6	26/-	28/9	28/3
Nov.	25..	22/-	28/9	31/6	19/6	20/-	27/-	27/3	29/6	19/-	—	28/6	28/6
	31..	21/6	29/-	31/9	19/6	20/-	27/3		29/9	19/-	—	28/6	28/-
	7..	21/-	28/9	31/9	18/9	19/-	27/-		30/-	18/6	26/-	28/6	28/9
	14..	21/-	28/9	31/6	18/9		26/9		29/3	18/6	—	28/-	27/6
Dec.	21..	20/6	28/6	31/-	18/9		26/6	26/9	29/3	18/-	25/6	27/9	27/3
	28..	20/6	28/6	31/-	19/-		26/-	26/3	29/3	18/-	25/-	27/9	27/-
	5..	20/6	28/6	31/-	19/-		26/-	26/3	29/3	18/-	25/-	27/9	27/3
	12..	20/6	28/3	31/6	18/9		26/-		29/3	18/-	24/6	27/6	27/-
Dec.	19..	20/6	28/-	31/6	18/6		25/6	28/-	29/3	18/-	24/6	—	27/-
	26..	20/-	27/6	31/6	18/-	18/3	25/3		28/6	—	24/-	—	26/9

YEARLY RECEIPTS AT THE FOUR PORTS, NEW YORK, BOSTON, PHILADELPHIA, AND
BALTIMORE (IN TONS), FOR EIGHT YEARS, 1877-1884.

FROM	Entire Year 1884.	Entire Year 1883.	Entire Year 1882.	Entire Year 1881.	Entire Year 1880.	Entire Year 1879.	Entire Year 1878.	Entire Year 1877.
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
Cuba	457085	425431	502410	421371	436891	499952	437417	384007
British W. I. Islands	64948	43738	23701	20290	20062	12759	13576	22494
Trinidad, P. S.	37866	30048	8538	3569	5127	2244	10219	24397
French W. I. Islands	30053	32780	28649	22997	23297	26827	31215	27463
Porto Rico	56430	46526	34693	23902	25816	29535	31917	1087
St. Croix	1279	902	1537	840	1147	1141	1577	28910
Demerara	19625	59614	34519	18613	18551	5878	6347	
Central America	444	476	971	585	2493	144	307	
Belize	764	833	605	515	655	522	504	
Surinam	1403	1637	1944	1674	1555	1681	1385	12873
Mexico	98	373	430	842	669	956	323	
Haiti and San Domingo	16953	11759	12017	6818	10249	6686	5868	
Brazil	142348	91343	81029	107901	72389	21580	35859	35892
Peru	943	1137	860	....	824	1539	601	
Europe	85248	45889	7204	5941	2352	9208	4338	7142
Philippine Islands	96398	109081	75634	80940	74079	48941	41435	71117
Java	3254	576	5422	15707	15637	13316	15602	17955
China	3865	7593	3827	5501	11353	....	2481	12898
Singapore	221	595	364	....	109	....	54	1087
Sundries	13646*	7759	9801	7365	9742	4488	1606	7120
Foreign	1032871	920090	834155	745371	732830	687367	642631	654442
Domestic	9380	4386	5296	7839	5854	21640	11645	9985
Total	1042251	924476	839451	753210	738684	709007	654276	664427

* Mauritius, 7350 tons; Tuticorin, 617½; Cape Town, 120 tons.

Willet & Hamlen's Statistical Report.

IMPORTS OF FOREIGN REFINED SUGAR.

The British Sugar Refiners' Committee furnish us with the following figures, giving the imports of foreign refined sugar for the month of December compared with the corresponding month of last year, and the average monthly imports for the year compared with those of 1882 and 1883, distinguishing the quantities of "Lumps and Loaves" from "other sorts," and giving the separate imports from each country:—

	" LUMPS AND LOAVES."						" OTHER SORTS," Including Crushed Loaf, Granulated, Crystallized, &c.						TOTAL.								
	Monthly Average.			Dec.,			Monthly Average.			Dec.,			Monthly Average.			Dec.,					
	1882.	1883.	1884.	1884.	1883.		1882.	1883.	1884.	1884.	1883.		1882.	1883.	1884.	1884.	1883.				
				Tons.	Tons.		Tons.	Tons.	Tons.	Tons.	Tons.		Tons.	Tons.	Tons.	Tons.	Tons.		Tons.	Tons.	Tons.
France	3638	3538	2737	1754	3275		1953	2477	1621	445	2738		5591	6015	4358	2199	6013				
Holland.....	1763	2352	3580	4137	2270		1522	1853	1948	2104	2184		3285	4205	5528	6241	4454				
Germany & Austria	513	588	552	1055	827		948	1854	2380	5853	3765		1461	2442	2932	6908	4592				
Belgium	657	319	183	131	178		67	124	151	156	119		724	443	334	287	297				
United States	94	226	962	176	..		101	294	3386	2366	37		195	520	4348	2542	37				
Other Countries ..	..	..	..	..	..		269	61	121	15	..		269	61	121	15	..	
Total.....	6665	7023	8014	7253	6550		4860	6663	9607	10939	8843		11525	13686	17621	18192	15393				

SUGAR STATISTICS—GREAT BRITAIN.

TO JANUARY 17TH, 1884 AND 1883. IN THOUSANDS OF TONS, TO
THE NEAREST THOUSAND.

	STOCKS.		DELIVERIES.		IMPORTS.	
	1885.	1884.	1885.	1884.	1885.	1884.
London	94	.. 94	13	.. 17	17	.. 24
Liverpool ..	111	.. 81	13	.. 16	13	.. 19
Bristol	7	.. 7	3	.. 3	5	.. 5
Clyde	51	.. 78	12	.. 10	15	.. 26
Total ..	263	260	41	46	50	74
	Increase....3		Decrease....5		Decrease.. 24	

SUGAR STATISTICS—UNITED STATES.

(From Messrs. Willett & Hamlin's Circular, New York.)

FOR THE FOUR PRINCIPAL PORTS. IN THOUSANDS OF TONS, TO THE
NEAREST THOUSAND. FOR DECEMBER, 1884 AND 1883.

	STOCKS.		DELIVERIES.		IMPORTS.	
	Jan. 1st,		For Dec.,		For Dec.,	
	1885.	1884.	1884.	1883.	1884.	1883.
New York	66	.. 45	45	.. 50	35	.. 57
Boston	23	.. 13	5	.. 15	5	.. 13
Philadelphia....	4	.. 3	3	.. 4	2	.. 5
Baltimore .....	..	.. ..	..	.. ..	..	.. ..
Total.....	93	61	53	69	42	75
	Increase.. 32		Decrease.. 16		Decrease.. 33	
Total for the Year ..	..	..	1014	914	104	924

In the case of Baltimore, where nothing is put down, it means that the Stock, Imports, and Deliveries, do not exceed 500 tons in each case.

STOCKS OF SUGAR IN THE CHIEF MARKETS OF EUROPE ON THE
30TH NOVEMBER, FOR THREE YEARS, IN THOUSANDS
OF TONS, TO THE NEAREST THOUSAND.

Great Britain.	France.	Holland	Germany (Zollverein)	Four other entrepôts.	TOTAL 1884.	TOTAL 1883.	TOTAL 1882.
244	234	20	172	26	696	535	445

CONSUMPTION OF SUGAR IN EUROPE FOR THREE YEARS, ENDING
30TH NOVEMBER, IN THOUSANDS OF TONS, TO
NEAREST THOUSAND.

Great Britain.	France.	Holland	Germany (Zollverein)	Four other entrepôts.	TOTAL 1884.	TOTAL 1883.	TOTAL 1882.
1093	436	45	374	311	2259	2305	2058

ESTIMATED CROP OF BEET ROOT SUGAR ON THE CONTINENT OF EUROPE,
FOR THE ENSUING SEASON, COMPARED WITH THE ACTUAL CROPS
OF THE THREE PREVIOUS SEASONS.

(From Licht's Monthly Circular.)

	1884-85.	1883-84.	1882-83.	1881-82.
	Tons.	Tons.	Tons.	Tons.
France.....	350,000 ..	473,676 ..	423,194 ..	393,269
Germany(Zollverein)1,	1,500,000 ..	986,403 ..	848,124 ..	644,775
Austro-Hungary....	525,000 ..	445,952 ..	473,002 ..	411,015
Russia and Poland ..	335,000 ..	307,697 ..	284,491 ..	308,799
Belgium	90,000 ..	106,586 ..	82,723 ..	73,136
Holland and other				
Countries.....	50,000 ..	40,000 ..	35,000 ..	30,000
Total.....	2,500,000	2,360,314	2,146,534	1,860,994

It will be seen that Mr. Licht has reduced his estimate since last month by 30,000 tons,—France, 25,000 tons, and Russia and Poland, 5000 tons. In the other countries there is no alteration.

STATE AND PROSPECTS OF THE ENGLISH SUGAR MARKET.

There has been a decided improvement in the position of the sugar market, both in raw and refined, but more especially in raws, during the past month; the advance in Jaggery being 9d. per cwt., and in other cane kinds fully 1s. per cwt.; whilst beet sugar 88% f.o.b. has gone up 1s. 6d. per cwt.; the price at the close of the month being 11s. 6d. for prompt and 11s. 9d. to 12s. for forward delivery.

This advance is now regarded as the first step to a permanent gain in values; and if the curtailment in the next season's sowings in Germany is carried out, even to half the extent that is being everywhere spoken of, other and more important additions are likely to be made. At present, the feeling in Germany is general, that if the evils under which the sugar industry is suffering are to be remedied, it must be by a sensible diminution in the production. Whilst this is so, as the *Sucrerie Indigène* remarks, every one looks to his neighbour, rather than himself, to make the reduction.

This improvement in the value of sugar, coming at this particular time, when cultivators of beet are making their arrangements for the coming season, may result in inducing many to cultivate a larger area with beets than, but for it, would be the case; even if this proves to be so, and the reduction is only 10 per cent., in the place of 20 per cent., this means a lessened production in the year, in Germany, of about 100,000 tons, which would have a great effect in raising prices again to their normal level.

On the 17th January, 1885, the deliveries show a decrease, as compared with the corresponding period of 1884, of 5041 tons, and the imports for the same period a decrease of 24,580 tons.

The imports of American refined for December, 1884, amounted to 4348 tons, making a total for the whole of the year of 52,176 tons, against 6240 tons in 1883, and 2340 tons in 1882.

The stocks in the United Kingdom on 17th January, 1885, were 263,303 tons, against 260,056 tons in 1883, and 227,685 tons in 1882.


FLOATING.		Last Month.
Porto Rico, fair to good Refining	12/- to 12/6	against 11/- to 11/6.
Cuba Centrifugals, 96% polarization	14/- to 14/3	„ 13/- to 13/3.
Cuba Muscovados, fair to good Refining	12/- to 12/6	„ 11/- to 11/6.
Bahia, middling to good Brown, No. 7 to 8½	10/- to 11/6	„ 9/- to 10/6.
Pernambuco, good to fine Brown	11/6 to 12/-	„ 10/9 to 11/-.
Java, No. 14	14/9 to 15/-	„ 13/9 to 14/-.
LANDED.		Last Month.
Madras Cane Jaggery	8/6 to 8/9	against 7/9 to 8/3.
Manilla Cebu and Ilo Ilo	8/6 to 8/9	„ 8/- to 8/3.
Paris Loaves, f.o.b.	17/- to 17/6	„ 17/- to 17/6.
Titlers	18/6 to 19/-	„ 18/- to 18/3.
Tate's Cubes	21/-	20/6
Austrian-German Beetroot, 88% f.o.b.	11/6 to 11/9	„ 10/- to 10/3.

THE SUGAR CANE.

No. 188.

MARCH 2, 1885.

VOL. XVII.

 The writers alone are responsible for their statements.

N.B.—All communications to be addressed, and Cheques and P.O. Orders made payable to HENRY THORP, Ducie Chambers, 57, Market Street, Manchester.

For Scale of Charges for Advertisements, see page xi.

For Table of Contents, see opposite the last page of each Number.

In the tabular statement which we gave last month, showing the consumption per head of the population, of the different commodities, for the past 20 years, the figures in the column "Molasses?" (page 100) got misplaced. At page 163 of the present number we give them as they ought to have appeared.

At the New Orleans Exposition is to be seen a very large collection of the different kinds of sugar cane, said to be the largest ever brought together; in the *Times Democrat* (New Orleans) is an interesting account of this collection, formed by Mr. Morris, of Jamaica, which we reproduce at page 153.

In addition to our usual monthly table, showing the imports of refined sugar into the United Kingdom, we give, at page 164, a table showing the imports for each month, separately, from January, 1884, to January, 1885, inclusive, with the monthly average imports for the past three years, 1882, 1883, and 1884.

For the information of those who have taken an interest in the "Bibliography of Sugar," which appeared in the *Sugar Cane* for January, March, April, and August, last year, we may state that we hope to continue the list in our next number. We have several pages of it in type, but want of room has hitherto compelled us to postpone their insertion.

At the recent Colonial Exhibition at Port Louis, Mauritius, the large Gold Medal was awarded to sugar produced on the Sans Souci Estate, and a Silver Medal for sugar produced on L'Etoile Estate. In both cases, the sugar was manufactured under the

Bernard-Ehrmann process—Messrs. Packard's Ehrmannite being used for the purpose.

In our last number, page 60, we called attention to a letter in the *Journal des Fabricants de Sucre*, in which was given the profit and loss account of a First-class German Sugar Factory. There is nothing like a "profit and loss account" for getting at the actual result. In a rule of thumb calculation, items of expenditure are apt to be overlooked or understated, so that the result, thus obtained, often differs materially from the actual. At page 138 will be found a translation of the letter in question, in extenso.

At page 117 will be found Part I. of a carefully prepared paper "On the Animal Parasites of the Sugar Cane," by Mr. H. Ling Roth, who has given considerable and close attention to these pests in cane cultivation. Part II., which deals more especially with the literature upon the subject, we hope to give in our April number. Although Mr. Roth's investigations have for the most part been confined to Queensland, the information he has been able to obtain, we feel sure, will be highly appreciated and valued by planters everywhere.

In the last number of the *American Chemical Review*, Chicago, under the head "Beet Sugar," is a lengthy extract, source not named, from which we take the following:—

"It has been demonstrated repeatedly that there is no country better calculated for raising sugar beets than the United States. It has been clearly shown that the beets raised in Virginia contain fully ten per cent. more saccharine matter than those raised either in Germany or France."

We suppose there must be those who can take in such statements as these, or they would not be put forth. The question naturally arises, How is it that the United States, with the advantages here spoken of, and with a protective tariff, which is equal in amount to four times that of the German bounties, that so little has been done in the manufacture of beet sugar in the United States? In the *Sugar Cane* for December, 1884, page 640, we gave statistics which showed that the entire domestic production was under 142,000 tons, and out of this total a little over 128,000 tons was produced in Louisiana, leaving not quite 14,000 tons for "other cane, maple, beet, and sorghum sugars."

The Hawaiian sugar industry, if we may judge of it by the present position of the largest sugar company in those islands, is just now in a very bad way, in spite of the reciprocity treaty which was to do such wonderful things for them. The *Hawaiian Commercial Sugar Company* was started in 1878 with the modest capital of £5,000, consisting of 1,000 shares. In 1882 the capital was increased to £500,000; Claus Spreckels, it is stated, holding half the shares. At that time the shares were sold at £21—whilst to-day they can be had for *One Shilling!* A meeting of the shareholders has recently been held in San Francisco, when a statement of their affairs was submitted. During the past year matters have gone wrong to the extent of some £60,000, with liabilities amounting to over £200,000. Claus Spreckels besides holding half of the shares, has a mortgage upon the property of about £200,000—so that the concern virtually reverts to him, and the other shareholders have to pocket a loss of about a quarter of a million sterling! All this in less than three years.

At page 124 we give a letter from Mr. Dod, the editor of the *Nueva Era*, on "Refining of Sugar in Cuba." In our December number, page 649, we inserted an interesting article which appeared in that paper on this subject, to which we added some comments of our own. Whilst we admitted the force of many of the points, raised in this article, in favour of refining on the spot, we called attention to some items, which would have to be placed against it. Amongst others, the first cost of a refining plant, and the cost of keeping same in repair, which would be considerably more in Cuba, than in England, or even in the United States; also to the cost of skilled labour which would have to be employed. To these Mr. Dod refers in his present letter. In the article in question the writer of it contends that the cost of coal—a serious one in a refinery—would be saved in Cuba, as megass would be used. Assuming that this is practicable, the saving so effected cannot be taken as a clear gain, as by using megass as fuel, it would necessitate extensive artificial manuring; for whatever is taken out of the ground must be put back in some form or other, if the productiveness of the soil is to be maintained, and this cost would have to be deducted from the saving in coal. We repeat we should like to see the experiment tried.

“Sugar Refining by Electricity!” is the last thing out. “The New York Electric Sugar Refining Company” has been started with this object, and samples of sugar so refined have been shown in London. The following particulars of the process we give in the Company’s own terms:—

“Boiling and the use of bone-black are altogether dispensed with, the process being dry throughout and automatic, so that the product is a hard sugar without any syrup. Raw sugar of the lowest grade, either from beetroot or the sugar cane can be converted into refined sugar of the highest grade as easily as raw sugar of the highest grade; and it is said that the loss in weight will not exceed one per cent. of the whole saccharine matter. The time required is only four hours, and any description of refined sugar can be produced, from the finest powdered up to and including cut and pressed loaf. The principal agent employed in the process is electricity, and as it has been ascertained that the cost will not be more than 3s. 4d. per ton, the invention bids fair to work a complete revolution in sugar refining. It is anticipated that the machinery will shortly be in a position to turn out several hundred tons per day; and when the new process has been fully developed it cannot fail to influence the price of refined sugar—not, perhaps, by reducing it below its present unprecedentedly low figure, but by placing a barrier on any material increase.”

Of the samples of sugar, of which there were six submitted, *The Grocer* of January 21st, thus speaks:—

“The samples of sugar offered for our inspection were all white. The first one shown us was a very fine semi-grain kind, not so soft and smooth as pulverised, but gritty like silver-sand, and such as is used by cooks and confectioners as “castor sugar” worth about 16s. per cwt. on the spot. The second lot was similar to American granulated, which has been already mentioned in our market reports, so that the trade in this case can be their own judges of its merits. The third sample was of a bold crystallised sugar, but of only a medium size as compared with the superior makes of the London and Liverpool Refiners, and might be valued at 18s. Sample No. 4 had a pearly appearance, even as coriander seed, and quite a novelty in itself for foreign refined. It much resembled some of Duncan’s town-made sugar, and might be expected to sell at about the same money. No. 5 sample was even more fanciful in its style, and most unlike any sugar we have seen, being as flaky in shape as Rio tapioca, and of a value that can be tested only by actual sales and purchases. The last sample inspected (No. 6) consisted of lump sugar broken up very small, and not unlike the pieces generally found in crushed kinds, but without the dust, and would probably sell at about 18s. per cwt.”

We give the account just as we have received it.

ON THE ANIMAL PARASITES OF THE SUGAR CANE.

BY HY. LING ROTH.

“And though no plant such luscious nectar yields
As yields the cane plant, yet, vile parricides !
Ungrateful ye ! the parent cane destroy.”

DR. GRAINGER.

INTRODUCTION.

From time to time attention is called in the daily papers to the periodical ravages which certain classes of insects make on our cultivated plants. A pest suddenly makes its appearance on a large scale, commits its ravages for several successive seasons, and having destroyed thousands of acres of crops relapses into its previous obscurity to emerge again at the first favourable opportunity. Until the actual damage is done, and hundreds of thousands of pounds have been irrecoverably lost, without taking into consideration the misery entailed on all classes interested in the infected crops, little or no attention is bestowed on the cause of the unfortunately favourable conditions which have led to the sudden outbreak of the attack and of the consequent disease. I believe it to be now a tolerably well-established fact that parasites are always more or less present in the crops, and that it is therefore by a study of their habits in the earlier, or, less favourable, stages of development as a pest, that the best knowledge is to be gained as to the manner in which they may be kept under control if not totally annihilated.

For practical purposes the insect pests may be divided into two classes. In the first division we may place the less important, or less harmful parasites which are common to most cultivated plants all over the world. To the second division belong such insects, &c., to whose attacks the plant is, sooner or later, bound to succumb. To this division belong the English turnip fly, and the French vine pest (*Phylloxera vastatrix*). In cases where, as sometimes happens, several species of parasites, belonging to the first division, attack a plant simultaneously and their combined action prove fatal to the plant attacked, it does not follow that these insects should be brought into the second category.

There is a third class to which belong such insects, &c., as are to be found on diseased plants, but which arrive after some other animal or

vegetable parasite has committed its ravages, and whose presence may therefore be looked upon as the effect of instead of as the cause of disease. With these we have little to do.

As in European Farming so in Tropical Agriculture, the cultivator of the soil has to contend with a host of small parasites, who levy an excessively heavy blackmail on his receipts. On land where a rotation of crops is customary parasites have to seek fresh pastures once a twelve month or oftener, and are frequently kept away for a considerable period by an absence of their special food. But in countries where sugar cane is cultivated there are obvious reasons for a continuous succession of the same crop.

The loss in interest and profit on large sugar works for one year's fallow or crop, other than sugar, would not be recompensed by the exceptionally high return which the cane might yield in the following year, on account of its freedom from disease and parasites, or even on account of better chemical and physical conditions of the soil. Thus, notwithstanding the large loss sustained by parasites the planter is obliged to grow his cane year after year on the same soil. Another facility offered to the spread of parasites, and more especially the smaller aptera is the indifference with which the planting body regard them. They are considered too small to do any harm. An examination of growing cane exhibits a variety of animal life which is simply marvellous, and the planter who thinks little of a single parasite ignores two important facts: firstly, that parasites breed most rapidly, and secondly, that myriads make up for want in individual size.

In this paper I propose to describe shortly the habits of the animal parasites of the sugar cane, as they have come under my notice at Mackay (Queensland), and then to collect briefly the references bearing on the subject in various publications.

PART I.

NOTES ON ANIMAL PARASITES OF THE SUGAR CANE MADE AT MACKAY (QUEENSLAND).

1. The COMMON CHAFER (*Hoplosternus* sp?).—The grub of this insect is one of the most destructive creatures we have to deal with. It attacks and destroys the roots of the cane, causing the leaves to become brown and dry up. The growth of the cane is arrested and the first high wind knocks it over. In this manner whole fields of cane are killed. When a stool of dying cane of this sort is drawn out of the ground it comes up without much tugging, and appears to have

few roots. When drawn out of the ground in the earlier stages of the attack as many as seventeen fat larvae may be discovered hard at their work of destruction. Towards the end of the year (Nov. and Dec.) the fully developed chafers appear above ground in large swarms. They feed chiefly, and are most lively, at night; during the day they are to be seen thickly clustered, some feeding, but all more or less drowsy, on fig-trees (Banyans), cocoa-nut trees, Poincianas, and many scrub and forest trees. The egg is probably deposited at considerable depth, as the chafer is provided with powerful fore legs with which to burrow into the ground. To me there appears an obstacle to any attempts to destroy the grub; it seems to dive deep into the ground before turning into chrysalis. In following the plough I have frequently picked up chrysalidae, but from not one of them did this chafer emerge. The great increase of this pest of late years is probably due to the wholesale annihilation of the native birds by means of the firearms of the Kanakas. The planters had on various occasions petitioned the Government to prohibit the indiscriminate use of guns by these labourers, but our request was only acceded to when the damage had already surpassed remedy. Steeping the plants in milk of lime does not prevent grubs' attack. Miss Ormerod recommends the restoration of the average amount of, or the prevention of destruction of, the insectivorous birds and bats as the only practical method of suppression.

2. *POU A POCHE BLANCHE*.—The specimens I obtained are, according to Mr. R. McLachlan, F.R.S., probably of the genus *Icerya*, but a distinct species. By many this parasite is not considered deleterious to the growth or welfare of the sugar cane. On some cane (Meera, for instance,) I have seen it at times in such swarms as to cause the cane to shoot up like thin reeds. On other cane (Rose Bamboo) I have seen it in considerable numbers, but without similarly affecting the growth. In the driest weather it manages to keep its surroundings more or less moist, and must necessarily withdraw this moisture from the cane. A small black ant, *Formica rufonigra*, Lown, appears to protect this coccus, and to milk it much in the same way as other species of ants do the European aphidae. An ant tickles the back of the coccus with its antennae; after a while a drop of clear sparkling fluid, which has a peculiar sweetish taste, exudes from the coccus, and the ant commences to drink this. The abdomen of the ant can be observed to swell during this operation.

and in the meantime two or three other ants may have appeared on the scene to share in the feast. These ants can occasionally be seen carrying the coccus about, but this is not the general mode of progression, as on drawing away the leaves the smaller parasites may be seen moving about. Wherever the coccus is found there also will the soil be discovered more or less thickly tenanted by these ants. Which is the cause of the others being there I am unable to say.

I consider the Pou as one of the greatest, if not the greatest, ravagers with which we are afflicted, and judging from the moisture and sweetness which this parasite withdraws from the cane, I consider that many a short crop is due, not so much to a dry season as to the disregarded presence of myriads of this pest.

In accordance with Mr. Bancroft Espeut's proposals I attempted once to overcome the coccus, and to that effect planted some *Dolichos Lablab* alongside a special patch of cane for two consecutive seasons. The bean certainly attracted some ladybird beetles, and these were occasionally to be found in the cane *feeding*, as it were, the coccus, but they do not appear to destroy it, and I found no appreciable diminution of its number.

When the cane is trashed the parasite may be destroyed by wiping down the stalk of the cane with the labourer's hands. Unfortunately the smaller or embryo coccus thrives in swarms within the green, and consequently still useful leaves, the removal of which is deleterious to the growth of the cane. Hence the planter is reduced to Hobson's choice, and must either leave the leaves to the coccus, or destroy the coccus and the leaves together. Steeping the plants in milk of lime I did not find of any use. Any discoverer of a remedy which would effectually lessen the numbers of this parasite would confer a boon on the planting community.

THE BORER MOTH.—At intervals the grub of this moth is very destructive to young cane. In wet springs (October-November), when it is exceedingly difficult to keep down the weeds and to maintain the ground clean to any extent, the presence of the grub may be detected by the dead or dying state of the central leaf of the shoots of the young plant. On pulling out this leaf it is found that the heart has been eaten away, that putrefaction with a most offensive smell has set in, and on the decaying matter the larvæ of some Diptera, similar to those found on cheese, may be met with. The grub apparently enters the young cane within a fortnight or so of its appearing above ground.

How the grub originally gets into the cane I am unable to say, but it eats up the heart, and if not fully developed by the time that this has been consumed, it leaves the cane and searches for a fresh piece. This it evidently does at night. When full grown it looks like a white caterpillar, with purple-speckled back, one and a quarter inch in length. It is transformed into pupa in the same hole in the young cane wherein it has been feeding. From some chrysalidæ which I obtained I gather that the pupal state lasts more than six days. My prepared specimens were unfortunately destroyed, shortly before my departure from Mackay, by ants and lice, so that I was unable to bring any home for classification, but I believe this pest to be identical with the *Diatraea Sacchari* of Guilding. I have kept it under control by sending boys with sharp pocket knives along the rows of cane. The boys "spotted" the dead or dying shoots and cut them off as close as possible to the parent cutting. They then opened the shoot and destroyed the fat grub. In some cases the grub had migrated to a fresh shoot, which as yet did not show any sign of decay, and thus escaped. In other cases when the boy fiddle-faddled too long with the shoot before cutting, the grub was seen attempting to escape by one of the holes. I found this plan comparatively cheap and very effective. I may add that while dirty fields were being destroyed wholesale by this grub, clean fields were not infected to any such extent.

WIRE WORM.—This grub and some other larvae of the Click-Beetles are to be found in the roots of the cane, but so far I have not found that they do any damage. It must be remembered that they belong to a bad family.

OTHER INSECTS.—On dry canes a small scarlet Hexapod, with long antennae, is frequently seen, but he is greatly outnumbered by an insect "belonging to the family *Psocidae* and identical with or nearly allied to the ordinary *Atropus Divinatoria*, that destroys collections of insects." (R. McLachlan, F.R.S.)

There is also to be seen between the bud and the stalk of the cane the grub of a Frog-Hopper (?) It has a dark green semi-transparent body, about a quarter of an inch or more in length, with a black head. Before turning into chrysalis it envelopes itself in a shell composed of small bits of dead vegetable matter, dry excrement, etc. I am uncertain as to the danger of its presence, but as it consumes part of the bud its destruction is probably advisable. Occasionally it dies in

its shell and therein are then found numerous Psocidae above mentioned.

APTERA.—Of the minute, almost colourless, wingless parasites I obtained several specimens, for the classification of which I have to thank Mr. A. D. Michael, F.L.S. One was a *Tyroglyphus longior*, a “most abundant creature, found almost everywhere, and feeding upon vegetable or dried animal matter. It would not be likely to prey upon living creatures, and would not be very likely to destroy the solid tissue of the sugar cane.” With these were some *Gamasids*. “These are predatory creatures, which were probably present to feed upon the *Tyroglyphi*.” As I have not yet found the *Gamasids* alone, Mr. Michael’s opinion is most probably correct; but while *Tyroglyphi* are found on cane leaves, wet or dry, the *Gamasids* are as yet only seen with them on, more or less, dry cane leaves. The habits of these parasites, and the cause of their presence on the cane, require further investigation.

RUST IN CANE.—This diseased state of the cane is, I think I may safely say, not any specific disease, but the result of a variety of causes.* I have found Dr. Bancroft’s *Acarus* and Fungus on rusted cane, and again numerous canes without a sign of either. If I remember right, according to my own observations, his *acarus* is always surrounded by moisture, that is to say, the holes in which it is found appear full of water, which more or less envelopes the parasites. That it commits much damage hardly admits of doubt, but more knowledge of its habits are still required.

REMARKS.—To be able in anyway to overcome the numerous animal parasites on the sugar cane, it is above all necessary to obtain full details of the habits of the pests in every stage of their existence. At certain periods of their existence they are more exposed to injury than at other times; their ordinary enemies have learned these periods, and are thus able to destroy them; but we can only discover their vulnerable point by the study above mentioned. It is also highly probable that not only must the habits of the parasites themselves be studied, but also to a very large extent the habits of the numerous species of ants which infest our cane fields. In some countries ants have been found useful, and in others harmful; we have thus to distinguish between them, and I feel certain that very instructive information regarding the destruction of the smaller para-

* See Liversidge.

sites will be obtained by a thorough examination of these ubiquitous Hymenoptera.

It is as well perhaps to call attention to a very wide-spread system in use among planters, which, in my opinion, is indirectly more or less conducive to the welfare of the parasites. I allude to the wasteful system of burning off the dead trash after the canes have been removed from the field. The reasons for doing this are:—1. That the labour of ploughing in the trash is excessive and that the trash takes too long to rot. 2. That the heat of the fire destroys the insects and other parasites.

The destruction of the trash by fire means the loss of very valuable organic fertilisers which if ploughed in properly would serve to improve soils mechanically and chemically. This fire system may in fact be considered a quick way of impoverishing the soil, and on which the cane must naturally grow more and more sickly, thus offering increased facilities to animal and vegetable parasites. Planters who have tried to plough in the trash find it by no means a heavy task, and as to its not rotting in the ground, it rots quite as soon as any other green plant ploughed in. The tops certainly do not rot soon, but then neither does the fire consume them. With regard to the destruction of the parasites by the fire my experience is quite the contrary. I have carefully examined many fields of rattoons where the trash has been burned, and have invariable found that they were quite as much attacked by parasites as on the few fields where fire had not been introduced. On one plantation the proprietor was in the habit of using his trash as stable litter, after which it was ploughed in; he suffered little from parasites, but other circumstances may have caused this absence. The coccus is to be found on the roots of the cane, and ants carry them about; when they are in the ground the fire does not reach them, because it cannot penetrate to the roots. The larvae of the chafer are also too deep in the soil for the fire to affect. The spores of fungi are carried about by the winds, and apterous parasites, besides their probable presence in the roots, may be, and are, freshly introduced into a cane field by plant-canes. I am aware that in condemning the fire system I am opposed to the general ideas of Queensland sugar planters, but their advocacy of the system is probably due to the little attention which has hitherto been paid to the animal parasites on the sugar cane.

(To be continued.)

REFINING OF SUGAR IN CUBA.

TO THE EDITOR OF THE "SUGAR CANE."

Sir,—The comments made upon the article translated from the *Nueva Era*,* are undoubtedly just in many cases, but under the conditions which prevail in the majority of the large plantations of the island of Cuba, to which the arguments adduced in favour of refining directly from the cane more particularly refers, your remarks rather strengthen the position taken up by the writer you cite.

There seem to be but two adequate courses left open to the cane sugar producer of the present day, and it is probable that in the near future he must make his choice between a product manufactured expressly for the refiner, and one fully suited to the wants of the consumer. As far as a considerable experience in the matter enables me to form an opinion, any middle path will only lead to loss, and if the low prices continue long, to eventual ruin. If want of technical knowledge or deficiency of means oblige the planter to limit himself to the production of sugar for remanufacture, it appears evident that to succeed financially he must produce *all* the saccharine matter his juice contains, only to such a form and state as will satisfy the exigencies of the refiner, without paying any attention whatever to the requirements of the consumer, with whom he has directly nothing at all to do. In order to compensate himself for the profit circumstances oblige him to cede to another, by a corresponding saving in time and labour, he must effect this reduction by the simplest, most economical, and expeditious means he can possibly attain.

As the solid state is that which offers less risk of loss during transportation, it seems evident that after thoroughly clarifying the juice by the most perfect means that exact no expensive adjuncts, he should reduce it to "concrete," as this kind of product appears to offer all the advantages which the producer of raw sugar ought to attempt attaining. It saves all the expense and loss attending the separation of the molasses; it reduces the liquid product to a condition which preserves it against leakage and deterioration from acidulation during transportation; it avoids the greater part of the perversion of sucrose (which results from the prolonged destructive distillation of the old time process), by the rapidity with which the

* See December, 1884, *Sugar Cane*, page 649.

concentration is effected), and it permits as great (or perhaps even greater) economy of labour as the double or triple effect apparatus.

There is unfortunately in the island of Cuba, apart from and at war with all purely industrial considerations, a pernicious influence at work, which precludes the manufacture of a kind of sugar which seems so well adapted to the best requirements of a large proportion of our sugar estates. The merchant who makes advances to the Cuban planter is generally a molasses buyer, and it does not suit his interest to encourage the production of a sort of sugar that deprives him of a large part of his trade, and at the same time of a superior molasses, which is used to improve by admixture the inferior quality of those yielded by centrifugaled produce. Until the planter becomes more independent of the molasses buyers, or the refiner appoints agents to make advances on his crops, the "concretor" will be entirely excluded from the list of sugar machinery on this island, and those who use the old Jamaica kettles must continue to produce muscovado, or sell their cane to neighbouring estates, as they are now doing.

If we turn now from the old-fashioned to the modernised plantations, and study what they are actually accomplishing, we must come to the conclusion that if the improved Icery process will give from all sorts of juice a sugar sufficiently purified to go directly to the consumer and compete favourably with the refiners' products, a very serious error is being committed in the result attained on these estates.

The outlay of acquiring and repairing of the expensive plant to which you refer is already incurred, and that skilled labour you cite is actually employed to produce an article well calculated in every respect but *one* to meet all the requirements of the real consumer. We find, however, that this product never reaches its true destination, but is captured on its way, or rather falls an easy prey to the refiner, who is converted by its one imperfection into an exclusive purchaser, and makes it pay a heavy toll to fit it for sale, simply because the juice from which it was extracted was not sufficiently purified at the beginning of a long series of expensive operations to attain one of the most important advantages of their use. The refiner, in order to remedy the original defect, is obliged to *undo* all that the producer has accomplished, after reducing the juice to syrup, except the separation of the molasses, which he has to repeat. He has to employ expensive bone black, which the planter

does not require. He has to sacrifice another five per cent. of sucrose to bring back the sugar to the same shape in which he received it, and pay for the cost of a large amount of fuel to evaporate water that did not exist in the cane. The loss to the producer does not even stop here. Besides the increase of molasses caused by forming crystals that are destined to be destroyed, he incurs another serious loss by not effecting himself that purification of the saccharine liquid which he needlessly leaves to the refiner. He destroys a part of that sucrose which is his main object by leaving the natural impurities of the juice in contact with the higher product throughout a prolonged process of concentration.

It is perfectly conceivable as an industrially economical proceeding, that one manufacturer should produce a raw material for another's use, or that he should make an article in the rough for another to perfect; but this does not seem to be at all what the cane producer is doing. On the contrary, to found a comparison, we must suppose a case that does not exist in any analogous industry. As, for instance, a maker of jewellery, who gives all that is required in the artistic form and strength of his ware, but from not sufficiently refining the material previous to its manufacture, should find himself constrained to sell his goods to another to melt down and purify anew, with a consequent loss of time, labour, and material to produce an otherwise inferior article, with the sole object of improving the colour of the gold used in the original manufacture.

What we find going on in a modernised tropical sugar-house, surely leaves us at complete liberty to suppose that the planter, who has always been more or less the victim of absolute notions, has continued to give, long after they became too crude to reach their destination, nearly the same form and conditions to his products, that he adopted when they went directly into consumption, solely from the force of old habits and not through any process of reasoning based upon the real requirements of the altered circumstances in which the material progress of the world has gradually placed him.

The production of cane sugar, which had its origin among the inferior races of the East, has also suffered adverse influences from its very initiation in the Western world that affect its progress to the present day. The planter has encountered disadvantages in his way that have made him a laggard in the tide of advancement, discovering nothing for himself, and adopting only just enough of what others

have discovered or invented for him, to fall short of his goal, and leave to others the perfecting of his produce; to awake at last to the fact that a rival, with an inferior raw material, has, by superior industrial and agricultural intelligence, brought him to the verge of ruin.

If we study the past history of his industry, we find that the principal reason why the cane planter, in contradistinction to other modern manufacturers, has never kept the quality of his products up to the standard of the requirements of the consumer as others have done, are abundantly obvious. In virtue of the monopoly he enjoyed, without improving to their full extent the opportunities it offered, the manufacture was so remunerative that he felt relieved from the constant necessity of bettering his agricultural and industrial operations, and was satisfied to make what was *good enough*, without aspiring to what was *best*. To add to an evil sufficient in itself, there was another even worse to clog his advancement. The labour he employed was simply an imported savage; of all the human race, the least calculated to become a true artizan, or skilled and efficient tiller of the soil.

The old monopoly has been destroyed, and sugar can be more or less economically produced in every civilized country, while most of the disadvantages the planter has been suffering from remain the same. With the loss of this one privilege, he is placed upon the same footing as the rest of his compeers in the industrial world, and must follow their example. It seems preposterous for him to pretend continuing the sacrifice of time and labour to *half* prepare an article for a consumer he does not reach, employing the while all the expensive machinery calculated to that end. It appears to be high time for the producer of cane sugar to decide upon one thing or the other. Either to manufacture for the *refiner* or the *consumer*, instead of pursuing a losing middle course, with no apparent result but the sacrifice of ten or fifteen per cent. of the comparatively small proportion of sugar he makes in the field, to give a profit to another for doing what he himself can accomplish with less trouble and expense.

There seems to be but little, if any, reason to doubt that an enormously increased consumption will soon give ample room for both refiners and planters, if those who have not the means to make a refined product will content themselves with the simplest possible form of sugar, made expressly for the remanufacturer's use, and bring the same scientific knowledge to bear upon the cultivation of the cane

that has brought the beet to its present high standard of excellence.

The cane producer has many advantages, of which he must inevitably avail himself in the future, to be enabled to compete with his more advanced European rival. His raw material, besides being a richer sacchariferous plant, can be cultivated entirely with modern labour-saving implements, substituting the brute force of the horse and mule, for the more expensive man power he generally employs.

An acre of cane can be raised at less cost than an acre of maize in the United States, if the same intelligence and implements are used. Unfortunately, it is precisely in this that the modern planter will meet the greatest obstacle to his rehabilitation.

The labourer he is doomed to employ belongs generally to a race selected in the olden time more for its aptitude for slavery, than the making of intelligent and industrious workmen. Just at one of the most critical periods of its existence, the tropical industry, when an intelligent, faithful tiller of the soil is most needed for the economical production of sugar in the field, the fatal error of the half-forgotten past, crops out anew as a stumbling-block at this late hour, like a malediction coming silently home to roost. The African, free or slave, cannot compete in excellence with the labourer of the more sterling white lineage, and the planter will be brought day by day nearer the conviction, that inferior races, whether from the "dark continent" or of Asiatic origin, offer no sure foundation for one of the most important industries of the civilized world. The indolent and unintellectual African; the weak and prejudiced coolie; and the ultra-conservative and vicious Chinese, offer a poor prospect for the future, and will have to be replaced by labourers of more vigorous and ambitious stuff, before the maximum of economy can be reached in cane sugar production.

I am, yours truly,

SANTIAGO DON.

Office of the "Nueva Era,"

December 20th, 1884.

IMPROVEMENTS IN FILTERING SACCHARINE AND
OTHER LIKE SOLUTIONS AND MIXTURES.

117, New Wall Street,

New York, January 28th, 1885.

TO THE EDITOR OF THE "SUGAR CANE."

Sir,—In my last communication I stated that I would soon write to you on another subject. This does not relate to the matter which I send to-day, but to some points of sugar analysis, which I will send you before long.

This communication concerns the process patented by me in England, January 22nd, 1883 (No. 257), of which I gave an account in *Sugar Cane* of May, 1884, page 248.

For the benefit of those who would like to experiment with this process, I will point out some improvements adopted since the account in your number of last May.

I have given up the use of sawdust made from resinous woods, which require a preliminary treatment with carbonate of soda. I find that sawdust of hard woods do not require any previous treatment, beyond being reduced to a sufficient degree of fineness, and being moistened. With fine oak sawdust, the colour of the solution is better after treatment. Two parts of oak sawdust for 100 of sugar in solution give a decolouration equivalent to 10 per cent. Two per cent. of sawdust is sufficient to facilitate the filtration of the lowest sugars in filter presses.

I have advised the use of sawdust sifted through No. 40 sieve, but find that even this is too coarse. A much better filtration and a better cake are obtained with sawdust sifted through No. 60 sieve. This sawdust can be recovered by washing the cake over a No. 60 sieve.

The recovery of sawdust is a very easy operation. I cannot enter into this subject again to-day, but will give the particulars to any of your readers who are interested in the subject.

In New York, oak can be bought by the cord at \$5.50. This can be brought to a fineness smaller than No. 60 mesh for total expense, including purchase of wood, not exceeding 20 cents per 100 lbs. Three quarters of the sawdust can be recovered for future operations. The daily outlay for fresh oak sawdust is a very small sum.

Yours very truly,

R. CASAMAJOR.

KLEEMAN'S "BROWN COAL" PROCESS FOR THE FILTRATION OF SUGAR LIQUORS.

189, St. Vincent Street,
Glasgow, 13th February, 1885.

TO THE EDITOR OF "THE SUGAR CANE."

Sir,—Since my communication to you on the discolourizing power of "Brown Coal," which appeared in the January number of *The Sugar Cane*, I have had quite a number of letters from chemists and others interested in the sugar industry, asking to take advantage of my offer to supply them with "Brown Coal," to test for themselves the point at issue in the discussion. To all those different correspondents who have communicated with me up to the present time, I have sent samples of "Brown Coal," with instructions as to the best mode of using same.

It is most gratifying to me to find in your January issue a letter from that eminent chemist and authority on sugar refining, who in a previous number of your magazine was so severe on "Brown Coal," even to the extent of denying it any discolourizing power whatever. He now voluntarily writes to your magazine to correct his former errors, and admits a decolourizing effect on different samples of sugars with which he experimented of 33° to 60°. This is no more than was due to himself, and closes a discussion on a point which is beyond doubt.

I wish, however, through your columns, to correct a false impression that seems to have arisen in the minds of some of your readers, viz., that "Brown Coal" is used solely for decolourizing, and, consequently, is meant to displace animal char. Now, while it is interesting to compare the respective decolourizing power of animal char and "Brown Coal," yet this leads one away from the main object contemplated by Mr. Kleeman in the use of "Brown Coal" for sugar liquors.

As your readers know, very many attempts have been made to supersede the Taylor filters and all their attendant waste by the filter press. Mr. Kleeman, in making the attempt to produce charcoal from "Brown Coal" for the "Remmers and Williamson" process, found that if "Brown Coal" was simply ground as taken from the mine, and added to sugar liquors, it not only absorbed the mucilaginous matters better than vegetable char, but gave in addition a very high decolourizing effect. This latter result was totally unlooked for, and no one will deny that it adds great value to the discovery.

Animal char possesses high decolourising effects, but very low absorbitive power for mucilaginous matter; therefore, as an aid to filtration by the filter press it is practically useless. Vegetable char, on the other hand,

possesses high absorptive power for mucilage and low decolourizing effects. "Brown Coal," however, possesses a higher absorptive power for mucilage than vegetable char, and also, up to the proportions necessary to effect the filtration of the lowest class of sugars, a higher decolourizing power than animal char. "Brown Coal," therefore, combines within itself, and to a much greater degree, the good qualities of both animal and vegetable char.

The primary purpose of using the "Brown Coal" is not so much to obtain a decolourizing effect, as to absorb the gummy matters in sugar solutions, which has previously prevented the use of filter presses in the refining of cane sugars, by coating the cloths with a thin film of gummy matter, thus preventing all but a very small quantity of liquor from passing through the filter cloth. The "Brown Coal," by absorbing the gum, keeps it off the cloth, and thus allows the liquor to pass comparatively easily through.

Taylor filters allow only about one gallon on an average of liquor at 38° B and 180° Fahr. per square foot of filtering area to pass through, owing to the deposition of gummy matters on the face of the cloth, and thus a very large amount of filtering area is necessary to do a day's work of a refinery; and not only so, but as it takes from 24 to 36 hours from the time of starting to filter until the bags have been dripped, steamed, washed, and hung in their places again, a double or triple Taylor plant is necessary to carry on continuous operations. I do not here propose to enter into any dissertation as to loss and waste caused by the Taylor system, because I presume that most of your readers, interested in the question, are able to go into this matter for themselves. I wish, however, for comparison, to say that, according to the per centage of "Brown Coal" used, from two to six gallons of liquor at 32° B and 160° Fahr. per square foot of filtering surface per hour can be put through a filter press having one inch cakes, or from 48 to 144 gallons in 24 hours. It is highly advantageous to filter at 32° B, because the wash liquor from the cakes in the press, when added to the heavy liquor, will bring the average density of the liquor running on to the animal char down to 27° or 28° B as is required; thus the present difficulty of dealing with the sweet water produced by the Taylor filter is entirely overcome. In addition to its absorptive power for gummy matters, "Brown Coal" has also a very marked effect in reducing the alkaline salts, as your readers will see on referring to the tables in my last letter;* thus increasing the amount of available crystallizable sugar, and likewise has a most marked effect in removing the objectionable taste and smell which are to be found in some sugars.

I append a table of per centages, as it might prove useful to some of your readers in making up any calculations they may think necessary on the subject.

Per centage of "Brown Coal" used on					
weight of sugar	5%	7½%	10%	12½%	15%
Gallons of liquor for each filtration per					
square foot of surface cakes one inch	6	4	3	2½	2
thick					

Yours &c., B. H. REMMERS.

* January *Sugar Cane*, page 22.

DETERMINATION OF GLUCOSE IN BEETROOT SUGAR.

At a meeting of chemists engaged in the sugar industry, held at the offices of the London Beetroot Sugar Association, on December 22nd, 1884, and convened for the purpose of arriving at an agreement to adopt an uniform method for the determination of so-called glucose in raw beetroot sugar, it was resolved, after discussion:—

1st. That pending the results of a careful and general examination of certain methods of work proposed by Messrs. T. L. Patterson and J. W. Biggart respectively, the estimation of glucose in beetroot sugar should be made by the direct application of Fehling's method in the ordinary well-known way.

2nd. That in carrying this method into practice, all those there assembled would adopt uniform procedure and precautions, as detailed under the following heads:—

(a.) The "Fehling's solution," to be made with the purest obtainable chemicals, and to be kept ready mixed in bottles protected from daylight.

(b.) The solution to be periodically tested by boiling for three minutes with a solution of pure cane sugar containing 10 to 15% sugar, and to be rejected if it suffers any decomposition thereby.

(c.) The solution to be titrated by help of a solution of invert sugar recently prepared, thus:—Dissolve 0.95 gramme cane sugar (= 1.0 gramme glucose) in about 50 cc. water, add 1 cc. fuming hydrochloric acid, heat this liquid slowly to 70° C, and maintain at that temperature for five minutes; cool and make up to 500 cc.

(d.) The titration to be made in a flask or boiling tube, and not in a basin, on 10 cc. of Fehling's solution, diluted with 40 cc. water, without any further addition of soda.

(e.) The end of the re-action to be determined by the use of potassic ferrocyanide and acetic acid applied to a portion of the liquid which has been filtered.

(f.) In using the Fehling's solution so prepared and standardised for the determination of glucose in a beet sugar, the same methods of work and of determining the end of the reaction should be followed as in standardising the test liquor itself.

(g.) The solution of beet sugar to be examined should be clarified by basic lead acetate in the same way as for the purpose of "polar-

ising," and all lead should be removed from the solution by precipitation in some convenient way—preferably by use of hydrosodic sulphite.

(h.) The solution of sugar to be tested to contain from 10 to 20 grammes in 100 cc.

C. HAUGHTON GILL,

Chairman of the Meeting.

The special methods of work referred to above, and which are recommended for examination, are here appended in the form in which they have been communicated by the authors.

APPENDIX I.—MR. BIGGART'S PAPER.

I.—THE RE-AGENTS.

1. An ordinary Fehling's copper solution, or any of its substitutes.
2. Acetic acid.
3. A dilute solution of potassic ferrocyanide (1 in 100).
4. A standard solution of invert sugar, prepared as follows:—

Weigh off .95 grammes best loaf sugar, previously dried, and wash it into a litre flask with about 50 cc.'s of water. After the sugar has dissolved, add to the liquid from 15 to 20 drops of moderately-strong hydrochloric acid. Having put a thermometer into the flask, place it on the top of the water-bath, or other convenient spot, where the heat can be raised to and maintained at a temperature of about 70° C., and allow it to remain for about ten minutes. By this treatment the acid has effected the complete inversion of the sugar.

The flask is now allowed to cool, and the thermometer removed and washed, the washings being received into the flask. Neutralise the acid with slight excess of sodium bicarbonate, and make the litre flask up to the containing mark, then shake up and secure the solution in a bottle. If correctly prepared, 1 cc. will equal .001 uncrystallizable sugar.

It yet remains to confirm the relation between the copper solution and the invert sugar, which, from the amount of sugar taken, and the volume to which it has been made up, ought to be such that 25 cc. invert sugar will correspond to .025 uncrystallizable sugar, or 5 cc. of copper solution, and the correctness of this is established by titrating 10 cc. of copper solution.

II.—THE PROCESS.

First Method.—Weigh off 15 grammes of the sugar to be analysed, and introduce it into a 100 cc. flask, with a small quantity of water; add 25 cc. of the standard invert sugar, dissolve the sugar, and make the flask up to the containing mark with water.

The contents of the flask are now well shaken, and a burette is filled with the solution.

Meanwhile, having secured a small boiling flask (about 4 oz.), introduce into it 5 cc. of copper solution, adding a few cc.'s of water, and place the flask over a lamp until the contents begin to boil; thereupon add 7 or 8 cc. of the raw sugar solution from the burette, place the flask over the lamp once more, and boil for a short time. Continue additions of 7 to 8 cc. of sugar solution with alternate boiling until the blue colour of the copper has almost disappeared, after which the sugar solution is added with more caution, and the exact point at which the copper is wholly precipitated is got by filtering off a small quantity of the liquid, and testing the filtrate with excess of acetic acid and ferrocyanide of potash, when, if a red precipitate be produced, the addition of sugar solution is still cautiously continued, until the filtrate so treated ceases to give any red coloration.

Second Method.—An aliquot part of the filtrate, which was used for polarising, and from which the organic matters have been removed by lead subacetate, is put into a 100 cc. flask and treated with a few drops of a strong solution of carbonate of soda to precipitate the excess of lead. 20 or 25 cc. of the standard solution of sugar are added, and the flask is now made up to the containing mark with water. The solution is filtered, and a portion of the filtrate is employed for making the estimation of the uncrystallizable sugar by the same steps as are adopted in the first method.

The calculations involved in both cases are represented by the following formula:—

Let G equal the number of grammes weighed off or taken in the aliquot part of the filtrate.

·025 grms. = value of 25 cc. invert sugar solution in terms of uncrystallizable sugar.

·025 grms. = value of 5 cc. copper solution.

Let C = number of cc. of sugar solution necessary to precipitate the copper in 5 cc. of the copper solution.

100 cc. = vol. to which the sugar solution was made up.

Then—

$$\left(\frac{·025 \times 100}{C} - ·025 \right) \left(\frac{100}{G} \right) = \times \% \text{ of uncrystallizable sugar.}$$

Example—

Suppose $G = 14$ grammes, and $C = 40$ cc., then—

$$\left(\frac{·025 \times 100}{40} - ·025 \right) \frac{·087 \times 100}{14} = ·26 \% \text{ uncrystallizable sugar.}$$

Most beetroot sugars, which contain a notable quantity of uncrystallizable sugar, have generally a characteristic smell different from the ordinary disagreeable smell of the greater number of raw beet sugar samples; but if this smell fail to discover uncrystallizable sugar, I have observed that its

presence is infallibly indicated by a strong darkening in colour which the sugar undergoes on being dried for three or four hours in the water-bath.

I have carefully examined the question, whether the organic matters of beet have any reducing effect on the copper solution, and find that they do exercise a slight influence; for if the organic matters be removed by lead subacetate, and the lead be afterwards removed by soda carbonate, the apparent uncrystallizable sugar shows a reduction of from .05 to .07 per cent. Method No. 2 has been suggested to overcome this difficulty, and may be adopted if thought advisable. But, in practice, I employ method No. 1.

Since writing the accompanying pamphlet I have made, and adopted the following modifications of the process described therein. The first change I find useful, and tests show that the second is necessary. *First*: Keep as store a 15% solution of invert sugar which is made slightly alkaline, after inversion this solution changes very little, and can be diluted to the proper strength and tested with little trouble. *Second*: Instead of determining the relation between the copper solution and invert sugar with copper solution and invert sugar solution by themselves, I find it necessary to arrive at the relative values in presence of an amount of pure sugar dissolved in 100 cc.'s equal to the quantity of raw beetroot sugar, which it is designed to employ when making the uncrystallizable sugar test. Though the sugar be not perfectly free from reducing power if this reducing power is known, then it can easily be allowed for. It will be obvious, that the use of lead and its subsequent separation are avoided by adopting this method of procedure.

J. W. BIGGART, Greenock.

APPENDIX II.—Mr. J. L. PATTERSON'S PAPER.

Uncrystallisable sugar exists to a small extent in many brands of beetroot sugar,—especially those of German origin,—and is sometimes accompanied with other bodies of a neutral or acid nature, which although not sugar, have doubtless the same melassigenic effect on the process of refining. Some of these bodies have a slight reducing action on Fehling's copper solution now almost universally used for the estimation of this variety of sugar. But it is not necessary, neither is it desirable in a commercial analysis, to separate or determine such, for it is highly probable that any organic body present capable of reducing Fehling's solution is also capable of lowering the coefficient of purity of the sample in the same way as uncrystallisable sugar does.

This process aims therefore at the estimation of the total reducing power of the sample and recording it in terms of uncrystallisable sugar. It may be said to be one of backward titration, in which a measured volume of Fehling's solution is boiled with a weighed quantity of the sugar under ex-

amination, and the *unreduced* cupric oxide determined by means of a standard sugar solution.

For this purpose we require—

1. A 50 cc. Mohr's burette graduated to $\frac{1}{2}$ cc.
2. Some flasks of 250 to 300 cc.'s capacity.
3. A copper solution prepared according to the instructions given in Fresenius' "Quantitative Analyses," or in Sutton's "Volumetric Analyses," which need not be detailed here. It is not necessary that this solution should be new. A few months' keeping does it no harm, as its glucose destroying power is determined for each batch of sugars to be analysed, with the same standard sugar solution as is used in the analysis.
4. A standard solution of *invert sugar* containing .002 grm. per cc. This solution is easily prepared in the following manner:—95 grm. of pure dry cane sugar is transferred to a small flask. 20 cc.'s water and 2 cc.'s hydrochloric acid are added. A thermometer is now inserted, and the flask with its contents placed in a water bath. When the temperature has risen to 70° C. inversion is complete, and the .95 grm. of cane sugar has been inverted into 1 grm. of invert sugar. The flask is now removed, cooled quickly under a water tap, and transferred to a 500 cc. flask; water is added up to the mark, and after thoroughly mixing the contents, we get the solution required. The acid may be *nearly* neutralized in the inverting flask before dilution, but it is not necessary to do so, as its presence in such small quantity has not been found to influence the result.

The manipulation is carried out in the following manner:—Ten cc.'s of the copper solution are carefully measured with a pipette into a 250 cc. flask; 40 c.c.'s of water are added and the contents boiled. The standard sugar solution is now added from a burette previously filled for the purpose, in quantity *nearly* sufficient to reduce the oxide of copper present, and the contents of the flask boiled again. The reduction is completed by the further addition of sugar solution in quantities of 1 or 2 cc.'s at a time, boiling after each addition until the blue colour disappears. A few drops are now filtered into a small conical test glass, and acidified with two drops of acetic acid. If no red precipitate or colouration is produced on the further addition of one drop of a very dilute solution of ferrocyanide of potassium, the reduction is complete. But if more than a faint redness is developed, another addition of sugar solution is necessary, and this must be continued as long as the filtrate from a fresh portion gives more than a very faint colouration with the ferrocyanide test. The manipulator should, however, be able to complete the reaction with a couple of tests after he is of opinion that the blue colour has disappeared. The operation should be repeated on another 10 cc.'s of the copper solution. If the quantity of sugar solution consumed in the two trials does not differ by more than a half per cent., the

mean may be taken as correct; but if more it should be repeated. We now have the exact glucose oxidising power of 10 cc.'s of the copper solution in cc.'s of the sugar solution.

To determine the uncrystallisable sugar in the sample, 10 grammes are weighed off and transferred to a 250 cc. flask; 40 cc.'s of water are added and the sugar dissolved by gentle heat. Ten cc.'s of the copper solution are then added, and the contents of the flask boiled, when the uncrystallisable sugar present will reduce a portion of the cupric oxide. What remains is completely reduced by running into the flask from the burette standard sugar solution in the manner already described, and until the ferrocyanide test shows that no more copper remains in solution. This test should also be repeated on other 10 grammes of the sample, and the mean of two closely agreeing results taken.

It is evident that if the sugar under examination contained reducing bodies, less standard sugar solution will have been used in the second titration than was required for the first, and that in proportion to the uncrystallisable sugar or other reducing bodies present. It is therefore only necessary to deduct the former from the latter, when we get the cc.'s of sugar solution, which contain the same amount of invert sugar as 10 grammes of the sample. This difference— $\times .002 \times 10$, or $\times .02$ —gives the per centage of reducing bodies in terms of uncrystallisable sugar in the sample. For example, 26 cc.'s of sugar solution were required to reduce 10 cc.'s of copper solution; but after the addition of 10 grammes of a sample of beetroot sugar, only 21 cc.'s of the invert solution were required to reduce the same volume. Therefore, $26 - 21 = 5$ cc.'s invert sugar solution, and $5 \times .02 = .10\%$ sugar in the sample.

Of course it is necessary, before proceeding to the estimation, to satisfy oneself, by careful qualitative testing, that the sample contains reducing bodies. Samples which have a "peculiar sweet odour," an acid re-action on test paper, or which become discoloured in the water bath while drying, are likely to contain uncrystallisable sugar.

For the sake of simplicity, I have said that the standard sugar solution should be prepared by inverting .95 grammes of cane sugar at the time it is wanted. This, however, is not necessary in a laboratory, where analyses of this description are frequently made. It is easier there to prepare a large quantity at once, by dissolving half a pound or more of cane sugar in four times its weight of water, adding two or three per cent. of sulphuric acid (H_2SO_4), and heating in a water bath for two or three hours. The acid is then removed by the addition of carbonate of lime and filtration. The filtrate is decolourised if necessary by passing it over animal charcoal, and evaporated to the consistence of syrup under reduced pressure. A well-inverted refinery syrup may also be used for the purpose. In either case the

copper reducing power should be very carefully determined, and the quantity required to be added to half a litre of water to make a standard solution containing .002 grammes per cc. calculated and noted on a label on the bottle. This amount can then be weighed off at any time and dissolved in the proper volume of water for use. I believe such a syrup will keep unaltered for some months in well stoppered bottles, but I have made no experiments to determine its keeping qualities.

T. L. PATTERSON.

Greenock, 10th January, 1885.

COST OF MANUFACTURING SUGAR IN GERMANY.

PROFIT AND LOSS ACCOUNT OF A FIRST-CLASS FACTORY, OBTAINING THE HIGH YIELD OF 11.77 IN SUGAR; SHOWING LARGE PROFITS FOR YEAR ENDING MAY, 1884, WITH ESTIMATED LOSSES FOR YEAR ENDING MAY, 1885.

The following is a translation of the letter from "*Un fabricant*," addressed to the *Journal des Fabricants de Sucre*, to which we referred in our last number (page 60).—ED. S. C.

Mr. Benard, vice-president of the Agricultural Society of Meaux, has published a remarkable report of a journey in Germany and Austria, undertaken in 1884, in the interests of agriculture. In this report we find an account of profits and losses up to the 30th May, 1884. We do not think it necessary to mention the name of the works in question, but it is interesting to compare results, after modifying the figures so as to agree with present prices.

The profit to be divided amounted to fr. 387,125.60 (£15,485), after having paid the interest on preference shares, the contribution to the sinking fund, and the cost of keeping up the works and plant.

The yield for 1883-84 was :—

1st jet	10.04
2nd „	1.12
3rd „	0.61
	—
	11.77
	—

This year several German works will obtain similar yields. We will assume that the works named by Mr. Bernard will have this year an equally good quality of beets, what would be its position after working up an equal weight of roots at the end of the year 1884-85?

The works in question worked up 22,037,500 kilos. of beetroots, consequently the yield was—

	Kilos.
Sugar of the 1st "jet"	2,212,565
" 2nd " 	246,820
" 3rd " 	134,428
	<u>2,593,813</u>

which were sold for fr. 1,727,087.70cts. (£69,040). This gives an average of fr. 66.66c. (53s. 4d.) per 100 kilos., (2 cwts.) duty included, not including the molasses.

Now the price of sugar to-day is 18 marks 25 pf. (18s. 3d.) per 50 kilos., basis 96° polarisation, = fr. 45.62cts. (36s. 6d.) per 100 kilos.

Let us adopt this average price for the total production. The receipts this year would only amount to :

	Francs.	Cts.
2,593,813 kilos @ fr. 45.62 (37s. 4d.) per		
100 kilos.....	1,181,297.50	
Adding the molasses as in the preceding		
year	18,900.—	
Different receipts (possibly bye-products)	5,160.95	

Total Receipts 1,205,358.45 = £48,214. 6s. 9d.

The expenses may be summed up as follows:—

	Francs.	Cts.
Seed	14,840.55	
Beetroots	547,988.60	
Impost.....	440,750.—	
Workmen's wages	61,536.85	
Coal	104,896.25	
Bone black.....	9,480.35	
General expenses	757,60.10	
Banking expenses and brokerage	30,881.—	
Maintenance of works and plant	23,109.80	

Total 1,309,243.50 = £52,369 14s. 9d.

Loss.

We have then—Receipts 1,205,358.45 }
 Expenses 1,309,243.53 } 103,885.05 = £4,155 8s. 0d.

Now, these works did not carry on their operations at an exaggerated expense, for we may calculate the expenses per 1,000 kilos. at

	Fr.C.	
Wages	2.79	} Total .. 13.87 = 11 1
Coal	4.76	
Bone black	0.43	
General expenses.....	3.44	
Banking, &c.	1.40	
Maintenance.....	1.05	

The beetroot was not too high priced, as it was calculated at only f.24.86. per 1,000 kilos. Admitting that we might reduce the cost of manufacture to 12 fcs. per 1,000 kilos., and the cost of beetroot by one-fourth, that is, to fcs. 18.65 (9s. 7½d.), this would mean a diminution of loss of

fr.41,210 for the cost of production, and

fr.136,850 for the cost of beets.

Total .. 178,060 francs (£7,122 8s.), against 103,885 francs loss. At this rate there would still remain a profit of nearly 75,000 francs (£3,000). But in order to do this, a yield of 11.70 must be obtained from the weight of beetroot worked up at a cost of 12fcs. per 1,000 kilos, and the beetroots must not cost more than 18fr. 65c. (15s.) per 1,000 kilos.

Now, if an average number of works can work at a cost of 12fr. per 1,000 kilos., and can manage so that their beets shall only cost them 18fr. 65c. per 1,000 kilos, an average number cannot obtain a yield of 11.70. Thus a works that under the same conditions could not obtain more than 10 % for all "jets" would by this fact alone have 180,000 francs less receipts, and would thus have a loss of more than 200,000 francs (£800).

It results from this that a manufactory must obtain a yield of *at least* 10.5 % in order not to incur loss, all the more as we have assumed the same price for the first "jet" as for the second, and also 96° polarisation.

Taking into account all these differences, it appears that to *make both ends meet*, a German sugar manufactory must obtain a yield of sugar of 10 to 11 kilos. per 1,000 kilos., and that the beetroot must not cost them more than f.18.50 (14s. 9½d.) to 19 fcs. (15s. 2½d.) per 1,000 kilos. How many are there that are in this position? We do not know, but certainly there are some. The situation of our redoubtable neighbours is not so brilliant as one might think, and France need not consider her own position as desperate.

By continuing the improvement of the beetroot, the reduction of the general expenses by all possible means, by extracting the sugar from the molasses, we do not doubt that the present quotation of 39fr. per 100 kilos (15s. 8d. per cwt.) will allow us, if not to make a large profit, yet to live and to wait.

We do not believe that our country will be able to regain the first rank among sugar producing countries, which it has now lost for several years, but we cherish the firm hope that the French production will not remain, for long, three times lower than that of Germany. Courage then !

THE CULTIVATION AND PREPARATION OF RHEA FIBRE.

From the *Tropical Agriculturist*.

It is time that Ceylon planters were looking to their laurels as the pioneers of "new products"; for, notwithstanding that attention was first called by a Ceylon planter (Mr. Kay-Shuttleworth) in our columns to the field presented here for the systematic cultivation of rhea, planters in Southern India are likely to lead the way. Perhaps, in this matter of fibre, Ceylon planters may be quite content to await the results of the pioneering work to which we are about to refer, in Wynaad. But our own hope was, and is, that capital for an experimental Fibre Plantation in Ceylon would be forthcoming from that wealthy manufacturing town in the old country, "the Jute Capital," to which a new fibre or a liberal supply of one of proved excellence means so much. A Dundee-Ceylon Fibre Plantation Limited Company with a capital so modest as even from R50,000 to R100,000 ought to be able to test, on a regular plantation, not only rhea but several other indigenous or imported fibrous plants, and among so wealthy a body as the jute manufacturers of Dundee, there should be little difficulty in having the shares placed. We commend the idea to the gentlemen connected with the General Fibres Company Limited, and with Death & Ellwood's machine, as well as to old Ceylon residents in Dundee and the neighbourhood. The report of progress in the cultivation of rhea and other fibres comes from the *Madras Mail*, where it is said of the operations of the Glenrock Company, Wynaad:—

Thirty acres of heavy forest land, forming the slopes of the hills surrounding the mill, so that there should be as little carriage of the green stems as possible, have been selected for the cultivation of the rhea nettle, now numbering 200,000 plants, in thriving condition, the result by successful propagation from the original stock of 2400 rooted seedlings obtained by the company between January and May last. The large forest trees in the clearing have been allowed to stand, to afford shade and protection; while the smaller trees and undergrowth were rooted out, and the ground well dug over. The drains are at distances of six feet apart across the slope of the hill, and serve a three-fold purpose: firstly, as catch drains, to intercept the wash which, in a heavy shower, is considerable, and greater in proportion to the steepness of the slope; secondly, as irrigation channels in which the water can be held, while saturation of the soil proceeds; and thirdly, as paths found to be necessary owing to the thick growth of the rhea, and the difficulty of otherwise moving about the plantation. At first the plants were put out at distances of eighteen inches apart, but it was soon found necessary, owing to the vigorous habit of the plant, and the forcing character of the soil, to remove the intermediate ones, and all extensions are now put out at three feet apart. During the heavy monsoon rains, it was difficult to clear the undergrowth and roots, which would not dry, and could not be burnt off

but the object being to save the season, and make the most of the few remaining months of the year during which planting operations could be successfully conducted, some expenditure was incurred in carrying the jungle stuff off the field. The established rhea in three months throws out vigorous shoots from the collar, which, when about six inches high, are removed from the parent plant, with their roots, and have been found the best. The greatest success has attended this method of stocking the plantation, though cuttings put down in nursery beds readily take root, and subsequently admit of transplanting without any very large percentage of failures.

Although rhea is the principal staple on the Glenrock estate—other fibre plants, on a less extensive scale, are being cultivated on land not suited for rhea, such as the aloe, the *Fourcroya*, the New Zealand flax, and *Colotropis*. Sufficient progress with these has not yet been made to enable an opinion to be pronounced regarding the suitability of the climate, and the locality; but the subject is borne in mind by the energetic and enthusiastic superintendent of the company, Mr. J. W. Minchin, who is carefully noting all matters of interest to the new industry. The fibre now being treated, is the young stems of the indigenous *Marocarpus*, of which there are several varieties in the forest. It is naturally a weakly plant, loving shade and moisture, but when cut down or layered along the ground, it throws out numbers of young shoots, which, in from two to three months, are from three to four feet long. Divested of their foliage, these stems are passed through Deane and Ellwood's machines (Smith's patent) in handfuls of five or six at a time, the smaller, delicate end being first inserted, and cleaned nearly to the thicker end where held in the hand, when the wisp is slowly withdrawn, and the unfinished end passed into the machine for the completion of the operation. The fibre, when wet, is white, clean, and soft, but as it dries the gum asserts itself and the fibre gets stiffer; in this state appearing like China grass of commerce, as hand prepared by the Chinese, and worth from £45 to £50 per ton in England. Samples of this same fibre chemically treated, from which all the gum was extracted, are beautifully white, and as soft and pliable as silk. In working the machine,—of which there are eight—three expert men are required, who change places among themselves: one on the right of the machine—and one on the left, to feed the green stems, while the third man supplies the other two with handfuls of the stems as required from the heaps weighed and stored before the machine. Behind, a boy receives the wisp of fibre as it is drawn from the machine, and after wiping it down with a cloth to remove the moisture and gummy matter, hangs it on a bamboo rod provided for the purpose beside him. As the rods are covered with fibre, other boys remove and fix them in niches prepared for their reception in the drying shed, where they are left until dry.

The work at present performed with the machines is on a limited scale, and is intended to give the operatives experience and celerity in the manipulation. The greatest quantity of work yet done is rather less than the passing of 3 cwt. of young green stems of wild rhea per hour, instead of the 10 cwt. promised in the advertisements of the General Fibre Company. But as the men acquire experience the outturn may reasonably be expected to be much greater. The eight machines have been erected, and are driven by a powerful turbine formerly intended to drive the stamping gear of the Gold-mining Company, and instead of the pump, which are supplied with the machines, being used to cause the jet of water by which the fibre is washed during treatment, the water is taken off from the bottom of the turbine columns, and by this means a much greater force is obtained. The drying shed is to be provided with steam pipes for heating the air, and is of capacity sufficient to dry off a single bale of fibre at a time. Owing to the humidity of the climate it has been found necessary to press and bale off the fibre immediately after it is dry, for which purpose a screw baling press is in process of erection. During the monsoon it is impossible, without arti-

ficial appliances, to dry the fibre. A boiler will supply the steam for heating the pipes in the drying shed, and at the same time will be found useful in the Favier decortication process for boiling the alkali lyes for preservation of colour and prevention of mildew, as well as for the chemical mixtures in which the fibre is steeped in subsequent processes. The vast and miscellaneous stores of machinery on the premises, sent out for the gold-mining operations, have been largely utilised, and the European artisans on the spot, whose terms of service with the Glenrock Company have not yet expired, are turning their ingenuity to the best account and showing the greatest zeal in starting the new industry.

On Glenrock, therefore, special advantages are found, but not greater than are presented in many districts in Ceylon, where water in abundance for power as well as for decorticating or bleaching purposes is available. We have now received the detailed report of the trial of the patent Rhea Machine in Calcutta, and we see that what was done in 23 minutes and "could be done by Madras natives in 9" was not work supposed to be done by hand as might be inferred, but with the machines—the natives referred to being the men who had gained experience of Death and Ellwood's machine in Madras. The full report in the Calcutta *Englishman* is as follows:—

FIBRE-EXTRACTING MACHINES.

Mr. Death has been rather unfortunate, not only in the unsettled state of the weather, which kept everyone who was not actually interested in fibres away from the public trial of his machine which took place on Saturday, but also in the absence of the assistance he calculated upon to render that trial more perfect, as he had engaged two trained Madrasees who have been working similar machines in that presidency to exhibit their skill, and the capacity of the machine in the hands of an ordinary native workman, but the steamer, in which they left Madras on the 18th inst., had not arrived up to the time of going to trial. Despite the rain and uninviting aspect of the day, about twenty-five people had collected in the shed by 1 o'clock, when Mr. Death, protected all over by a waterproof against the spray from the machine, began operations with 12lbs. of fresh rhea stalks, cut that morning. Single-handed, using only one machine of the pair and feeding three stalks at a time, he completed the whole quantity in 23 minutes, and that with perfect ease, without the least attempt at hurry, in fact talking a good deal all the time. The Madrasees would have done the same quantity in 9 minutes, working the pair of machines. The engine is a vertical portable of 4 H.-P., with 50 lbs. of steam, and working 600 revolutions a minute. It is quite capable of working another pair of machines at the same time and at the same speed. Each machine can strip 3,500 stalks per hour, or in a working day of 10 hours an engine and its four machines can strip 140,000 stalks, or 46,500 strings of rhea per day, requiring four trained workmen and four cooly attendants merely to hand the stocks, which are held lightly in the hand and allowed to be drawn in by the breakers. When half the stalk has been treated the hand is lowered, and the fibre tightened on the feeds-plate and drawn quickly but evenly back, when the stalks are reversed and the other half treated in the same way, which is also drawn out by the same motion. The string, as it is now called, is then hung up to dry. Every "eye" along the stalk, that is, every place where a leaf has been, will occasion a certain amount of breakage in the fibre. All such broken portions are collected together at the end of the stalk, and are subsequently cut off. These tufts are to rhea what "Chusen" is to silk, only of relatively greater

value, as "rhea waste," as it is called, brings within £8 per ton of the average price paid for the baled fibre, and is made into the best Whitney blankets. The fibre requires no further process whatever. When dry it is tied in bundles about 9 to 10 inches in circumference, doubled across the centre and baled. It still retains a small portion of gum, which is latent in the fibre and exudes in the process of drying, but this, so far from being any harm, is a decided advantage, as it protects the fibre from damage during baling and subsequent shipment and carriage, and is easily removed by the manufacturer before being worked into its intended fabrics. The machine itself is beautifully simple, consisting of a hollow cast-iron cylinder or drum eighteen inches diameter and fourteen inches wide, with brass angle bars projecting about one inch and a half from the outer rim. These are the breakers. In front is a flat feed-bed made of heavy white metal with flanged sides and adjusting screw to regulate the distance between it and the breakers, so as to suit any thing from plantain to sunn. There is a movable sheet iron cover over the drum, and all the parts of the machine are very neatly finished. Beneath the feedbed is its speciality—a perforated pipe which throws a very powerful flattened jet of water against the fibre. It is sufficiently strong to remove and carry away every portion off the woody centre of the stalks after it has been broken up by the breakers, and aided by the high rate of speed it keeps the string curved round the drum which scrapes on the bark, and washes out the gum and fecula in the stalk and turns out the fibre ready for baling. The Death and Ellwood is no doubt a perfect success, in so much that it does all it professes to do, and it does it expeditiously, cheaply and well. In the warm weather of April and May living rhea could be cut in the morning, passed through the machine, dried, tied, baled and shipped before sunset. This is due to the absence of any retting process, which is so dilatory, troublesome, and requires localities specially suited in the matter of steeping places. Rhea fibre is at present not much quoted in the home markets, because the supply is so uncertain that manufacturers do not use it. In 1870 it was selling in London at £120 per ton, but this is far above its value. At present it is quoted at £35, which again is far below the value. Once it becomes an established industry with regular shipments, it should command from £60 to £70 per ton. An idea of its great strength and value in some instances may be gained from its use in hydraulic machines. Where hoses made of the strongest known vegetable fibre, not rhea, will only stand a pressure of 300 lb. rhea will stand 800 lb. and burst the machine, and has done so. Only rhea was tried on Saturday, but there will be another trial on Wednesday next after tiffin or at 3 p.m., when rhea and other fibres will be tried, as it is hoped the Madraseses will have arrived before then.

We shall watch with much interest the further prosecution of the Glenrock experiment, but the results will probably not be fully given to the public, more especially if the directors find they have "struck gold" at last, through cultivating rhea and other fibres. Let Dundee come to the front and establish a plantation in Ceylon, on which every fibrous plant under the sun, if need be, can be tried.

PRACTICAL RESULTS OF RAMIE (OR RHEA) CULTURE.

BY HENRY SANFORD BERGMAN.

CULTIVATION, DECORTICATING, BLEACHING, AND SPINNING.

For several years the farmers in the northern part of France have raised ramie as a better paying culture than that of wine. Three crops can be raised on a hectare equal to two acres, viz., in the middle of the months of June, August, and October. One crop will yield 60,000 kilogs. per hectare, or 180,000 kilogs. in all, which can be sold at 8 francs per kilog., thus giving a crop valued at 4,800 frs. (\$950 per year). The total cost of roots, planting, and labour amounts to 1,200 frs. per hectare in the first year; in the following years no cost except for labour are to be incurred, as the ramie plant is a perennial plant. The culture of ramie on a large scale is more remunerative, as the cost of labour is thus gradually diminished. The decortivating and baling of the fibres is generally done on the spot, under a shed; the stalks bring a price of 8 frs. per 100 kilogs.

The difference between raising ramie on a small and large scale is illustrated thus: A small grower sells his stalks at 8 frs. per 100 kilogs., receiving 4,800 frs. per hectare; a large grower, who decorticates the fibre, sells it 1 fr. per kilog., receiving 12,000 frs. per hectare, or at a difference of 7,200 frs. per hectare. A decortivating machine, system Berthet, costs 5,000 frs., and is sufficient for 10 hectares, or 20 acres. One machine will clean 1,200 kilogs. dry stalks per day, which yield from 23 to 25 per cent., or 270 kilogs. clean stalks. According to this, a yearly crop of 180,000 kilogs. ramie will yield 54,000 kilogs. dry stalks per hectare. The bleaching and preparing processes produce 80 per cent. of clean white fibres, free from gum, or 9,600 kilogs. of a silk-like fibre. After these processes the fibre is combed, by which process 80 per cent., or 7,680 kilogs. silk floss and 1,920 kilogs. noils are obtained. These products command a price of 4 frs. and 1½ frs. per kilog. respectively.

The yield is as follows:—

	Francs.
7,680 kilogs. floss, at 4 frs.....	30,720
1,920 „ noils, at 1½ frs.....	2,880

Totalfr. 33,600 = £1,344

The expenses will amount to 14,000 frs., leaving a balance of 19,600 frs., (£784).

The loss and waste in spinning the yarn amounts to 7 per cent. Thus from 7,680 kilogs. floss, 7,000 kilogs. yarn can be obtained in Nos. 50, 60, and

80 at a selling price of 8, 9, and 12 francs respectively. According to the size of yarn spun, a clear profit of from 56,000 to 84,000 frs. can be made, after all the wages for labour, for cultivation, decorticating, bleaching, combing, and spinning have been paid. A plant of 5,000 spindles will produce 500 kilogs. yarn per day, or 150,000 kilogs. per year of 300 days. The consumption would be 251,000 kilogs. bleached fibre, equal to 1,100,000 kilogs. decorticated stalks, and 3,600,000 kilogs, green ramie. Such a production would require a farm of 20 hectares, or 40 acres, at three crops per year, with four decorticating machines.

The cost of a plant of 5,000 spindles, including buildings and other machinery, would amount to 700,000 frs. (£28,000); further, a cash capital of 300,000 frs. (£12,000), for buying, &c., would be required, or a total of 1,000,000 frs. The following is an estimate of expenses:—

	Francs.
Wages, at 400 frs. per day, 300 days	120,000
Coal, engine, &c.....	30,000
Management and office expenses	85,000
Total	235,000
Raw material—3,600,000 kilogs. green stalks at 8 frs. per 100 kilogs.	288,000
Total per year	523,000
Production—150,000 kilos. yarn, Nos. 30 to 40, at 7 frs.	1,050,000
50,000 kilogs noils at 1.50 frs.	75,000
Deduct expenses and raw material	523,000
Leaving a profit of	602,000 or £24,080

The above calculations will amply demonstrate the importance of so remunerative a cultivation of this plant.

SPINNING AND MANUFACTURING OF RAMIE CLOTH.

The first spinning mill of importance was started in Zittau, Saxony, several years ago, by F. E. Seidel and Co. Mr. Siedel, who was a retired merchant of large means, operated a number of years with chemical and mechanical assistance to obtain practical results. Frequent necessary changes of the machines required additional financial assistance, but at last he succeeded, and at present is running his mill overtime to fill the numerous orders from Europe and America. American hosiery manufacturers are using ramie yarns for imitating hosiery which was imported as a silk mixture. In Europe ramie is employed for making saddlers' and shoe-

makers' twists, for fancy sewing silks, being lustrous like silk and having twice the strength of the best silk or linen thread. Fine ramie yarns are used in silk manufacturing as filling; the noils are bought by woollen manufacturers for so-called silk-mixed goods.

Of late fine guipure laces and lace curtains were manufactured by Seidel and Richter, at Zittau; the same yarns and articles are also made in France by a large company who bought the patents for France from F. E. Seidel and Co. This company is also notable for its enormous demand for yarn. The latest product from ramie is sealskin plush, which is equal to silk-seal plush, and is sold in large New York dry goods stores at from \$12 to \$18 per yard, being the most perfect imitation of seal.

At the Industrial Exhibition at Rouen, in 1884, the ramie industry was represented by a new decorticating machine of the system Berthet, and a collection of samples of ramie in the various degrees of the process of manufacturing, and its application, as decorticated, bleached, combed, spun, dyed, and woven; these samples have been sent partly from Algeria, by M. Ferray d'Essonnes, by M. Wallon, finisher, and by Caron and Miray, dyers. In the south of France and in Algeria four crops can be obtained per year. For this decorticating machine, which works other fibres as well as ramie, a gold medal has been awarded to M. Barchet, and the results obtained by it fully correspond with figures above mentioned. M. Barchet, who is director of spinning and weaving, has been in Louisiana to organise a cotton spinning and weaving mill. While sojourning there and in Mexico he conceived the idea of his decorticating machine, which has given such satisfactory results.

English manufacturers are using ramie for making alpacas, by mixing wool and ramie, which gives a superior article to cotton and wool.

Introducing the ramie culture in the United States is principally due to the efforts of the *Dry Goods Bulletin*, which for years acted as the pioneer of this industry, by publishing leading articles on the merits and advantages of this culture. It has received samples of fibres, yarns, and fabrics from its foreign correspondents, and has called the attention of its readers to the mixture of silk goods with ramie. Beautiful laces and lace curtains are being made from ramie, samples of which are open for inspection. Of late the majority of the American and foreign textile papers have taken up the subject of ramie culture. There was no profit made yet in this country by planting ramie, as most of the culturists merely have grown it for a pastime or for experimenting, and no proper machine for decorticating the fibre built. This fault is now remedied by T. Albee Smith's and by Berthet's machine.

Besides the *Dry Goods Bulletin* some capitalists interested themselves in the ramie culture. Mr. David S. Ogden, founder of the Hyde Park at Chicago and general agent of Illinois Railroad Land Office, a gentleman full of life and enterprise, started with the writer of this for the United States

of Columbia, to explore the pita ramie and other fibrous plant. After a difficult travel of eight months, mostly on mules, we returned, having achieved splendid results, and then we sailed for Europe, to find the most appropriate machinery for decorticating and spinning ramie. We travelled through England, Scotland, Ireland, France, and Germany for eight months, we visited machine builders and yarn spinners, and had the intention to go to work on a large scale. Mr. Ogden, previous to going to Europe, secured a contract with Mexican and New York capitalists, with power of attorney, authorising him to use his own judgment in selecting and buying machinery, we to furnish our experience and the bankers the capital for this enterprise.

After having returned to this country, Mr. Ogden died three weeks afterward, which unfortunate event left the matter in the same state as two years ago. Later the writer made the acquaintance of Mr. Jagerhuber, editor of the *Dry Goods Bulletin*, who had devoted many years' study to the vegetable fibres.

A large collection of samples of yarns and fabrics are to be found at the office of the *Dry Goods Bulletin*, which consists of specimens of ramie, in all the degrees of the process of manufacturing, and serve to demonstrate the importance of the cultivation of the ramie plant, its preparation for the use of yarn and textile manufacturers in the United States.

The time is near at hand when every manufacturer of textile fabrics *must* calculate with ramie, if he wants to keep alive.

Thus far the practical results achieved are a *complete triumph*, and, in my opinion, the American people, from the farmer and mechanic up to the merchant and manufacturer, will soon have occasion to express their gratitude to the pioneers of this great industry, but above all to the unselfish and persistent labour of the editor of this paper, Mr. Jagerhuber, who has helped us more than all European agitators.—*New York Dry Goods Bulletin*.

BEETROOT CULTIVATION IN ENGLAND.

Some time ago the growth of beetroot for sugar making was strongly recommended to Suffolk farmers, but we advised that nothing over experimental crops should be grown. This has been the case, and the result has been, that instead of crops realising from £10 to £12 per acre, only £7 10s. per acre has been realised, and for this sum the roots have to be delivered at the factory unbruised. During the coming year, also, the owners of the factory state that a re-arrangement in the scale paid for roots will have to be made, and though it is contended that no reduction will be made in the price of good beet, it is clear that, on the whole, less money per ton will be paid. So far as the Suffolk farmers are concerned the experience is not of a kind to warrant a large growth of the crop.—*Morning Post*, Feb. 10, 1885.

ON THE MANUFACTURE OF RUM, SPIRIT, AND ALCOHOL.

It may interest, and be of some use, to those of our sugar planters who manufacture rum, if we give a description of an improved continuous still brought out by Messrs. Breymann and Hübener, of Hamburg, who have had considerable experience both in Germany and in our colonies in erecting and furnishing the needful outfit of complete distillery plants.

Owing to the extensive devastation of the vineyards on the Continent by the phyloxera, very large quantities of spirit are being used at the present time for the mixing and blending of the French, Spanish, and Portuguese wines. There is, we are told, not a ship leaving Hamburg for Bordeaux and the Mediterranean, which has not large quantities of ff spirit on board as cargo.

Whilst the consumption of spirits shows a marked diminution in Great Britain, this is not so on the Continent, and especially in Spain.

In this apparatus, as shown in Fig. 1, may be distilled, according to demand, either spirits of high degree up to 95 % Tr. = 40° Cart, or rum and brandy of only 55-65 % = 20-24° Cart, the change from high degree to low degree spirit, being effected without any interruption of the continuous working of the apparatus, by simply opening or closing 2 throttle valves.

These throttle valves are arranged in the pipes A and B, as shown in the drawing, if it be wished to produce spirits of high degree, then the valve at A has to be closed and that at B to be opened, in which case the alcoholic vapours are forced to pass through the rectifying cylinder before going to the condenser. If, however, spirit of low degree is desired, the valve at A is opened and that at B closed, throwing the rectifying cylinder out of action, and allowing the vapours to pass direct from the mash cylinder to the condenser.

The mash column is composed of a number of divisions, the lowest of which is fitted with steam inlet, and a wash discharge. The steam inlet consists of a perforated coiled pipe, while the wash discharge is a vessel provided with a floating ball, which automatically regulates the outlet. Opposite the overflows, cleaning holes are provided which are closed by brass screwed taps, so as to give easy access to the overflows. The top mash boiling chamber is provided with a safety pipe, fitted with a glass tube, which at the commencement of the distilling is filled with water. The column of water in the glass tube indicates the steam pressure in the apparatus. The bottom mash boiling chamber has attached to its highest point a steam gauge-cock, which communicates with a cooling coil, placed in the test vessel. During the still is working the operator can thus at all

times ascertain when and how much alcohol is contained in the mash indicating if more or less wort should be supplied to the mash column, so as to get through the largest possible quantity in a given time with the best possible results.

The rectifying column contains a number of evaporating chambers, the number of which can be increased according to the requirements of spirits of high percentage or purity. The lower of these chambers are also fitted with cleaning holes.

The apparatus works remarkably quiet, it is easily manipulated, and has the following important advantages over all other mash apparatus:—

1. Very considerable saving in fuel, varying according to the conditions of plant generally from 25 to 50 %.
2. Considerably lower demand of water.
3. Extraordinary fine and high degree quality of the produced spirit up to 95 % Tralles = 39.29° Cart.
4. Separation of low still from the wash, producing healthier cattle food, free from verdigris.
5. Perfectly continuous and regular working.
6. Absolutely pure wash, free from alcohol.
7. Exceptional simplicity of construction, facilitating the erection and the replacement of parts after many years wear.
8. Perfect simplicity of manipulation and impossibility of getting choked.

The apparatus are made entirely of strong copper, which, to increase durability still more than usual, are on the inside completely tinned with English tin; this ensures, as experience has shown, a great improvement in the taste of the production, and considerably adds to the durability of the apparatus.

DESCRIPTION OF THE CONTINUOUS STEAM STILL.

- C. Mash column.
- F. Rectifying column.
- G. Feints column.
- H. Cooler.
- J. Condenser and preliminary heater.
- D. Testing vessel.
- E. Wash Regulator.
- K. Alcoholic closure with glass globe.
- L. Steam mash pump.
- A. and B. Two throttle valves, by means of which the change from low degree to high degree spirit is effected without any interruption of the continuous working of the apparatus.

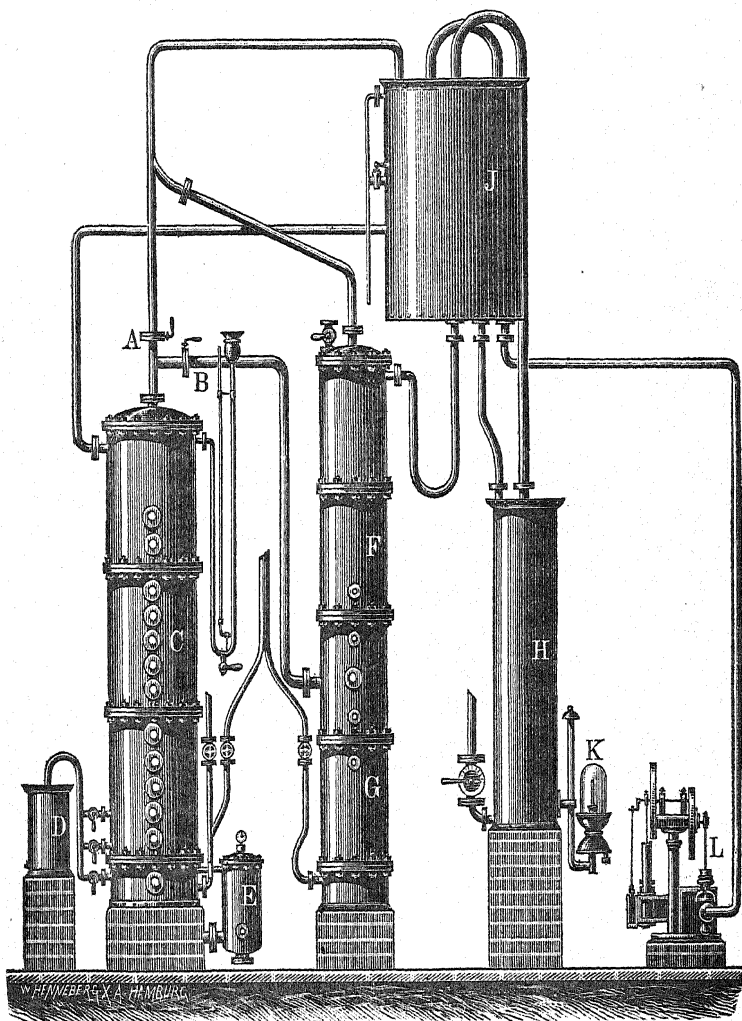


FIG. 1.

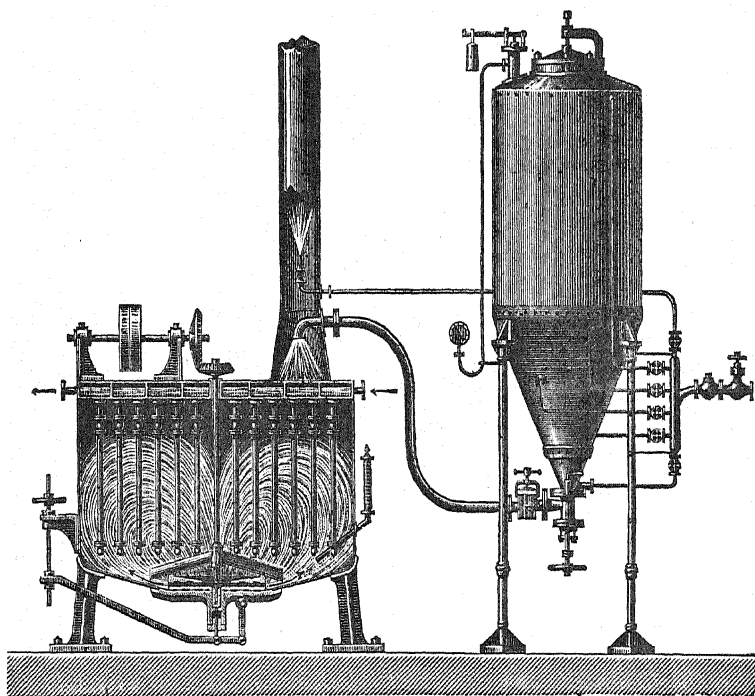


FIG. 2. HENZE STEAMER WITH MASHING APPARATUS.

E. STEINMETZ. X. A.

THE HENZE STEAMING APPARATUS.

For the benefit of the corn and potatoes growing countries, we also beg to give an illustration of the "Henze Steamer," which is one of the most important inventions ever made in the manufacture of spirit from grain or potatoes. It was invented by Hollefreund, and very materially improved, and introduced on a large scale, by the Honourable Hermann Henze, a large proprietor of landed estates. It is certainly no exaggeration to state that within the first ten years from its invention some 7,000—8,000 Henze steamers have been put up.

The extraordinary advantage of this apparatus is, in the first instance, a more complete dissolving of the raw material and of converting all the starch, containing particles, into soluble sugar, and consequently into alcoholisable substances, the result of which is a much higher percentage of alcohol. The second advantage is, that with this system, raw materials can be used now, which either could not be used at all, such as frozen or rotten potatoes, or which only gave a very poor yield, such as maize, rice, &c.

We think it will interest our readers who grow potatoes, maize, or other kinds of corn, if we give a short description of the apparatus.

The steaming apparatus consists, as will be seen by figure 2, of a cylindrical iron vessel with a manhole on the top for the filling with the raw material. The bottom of the iron vessel has a conical form, in which a number of steam pipes is introduced in such a manner as to give the raw material a rotating motion as if stirred by a mechanical stirring apparatus. As soon as the raw material is thoroughly steamed the valve at the bottom is opened and the boiled material blown through a kind of grate or sieve, where even the smallest particles of corn or potatoes are completely dissolved into the centrifugal mashing apparatus. This apparatus consists of a round tub with a somewhat conical bottom, in the midst of which there is a centrifugal disintegrator with a stirring rake, which is moved by means of a pulley, which mixes the fluids with the malt in a very effectual manner.

The cooling down of the steamed raw material and of the mash is of the greatest importance in order to ensure a rapid conversion of the mash into sugar containing liquor. This is effected in the first instance by an exhaust fixed near the discharge pipe connecting the steamer with the mash tub, which will bring the temperature down to 130-140°F. In the mash tub there is moreover a complete system of tubes, through which a stream of cold water is running, and by means of which the mash is cooled very quickly to the temperature most suitable for fermentation. The mash is then pumped by means of a pump into the fermenting tubs, where the fermentation takes place after a sufficient quantity of yeast has been added; the fermented wash is then ready for distillation.

Full details of these machines may be seen in the illustrated catalogue of Breymann and Hübener, Hamburg, in the English, Spanish, and French languages.

NEW ORLEANS EXPOSITION, 1885.

EXHIBIT OF THE LEADING SUGAR CANES OF THE WORLD.

From the *Times Democrat*, February 6th, 1885.

As an adjunct to the exhibit of tropical fruits now on view at the Horticultural Hall there is shown a very complete exhibit of all the chief varieties of the sugar cane as cultivated in different parts of the world. This collection has been obtained from the Botanical Gardens in Jamaica, where Mr. Morris, director of these gardens and Jamaica commissioner to the World's Fair, has brought together fifty-eight varieties of sugar-cane, making possibly the most complete assemblage of sugar-canes ever brought together. These are intended principally for distribution throughout the British West

India Islands, so as to increase the production of sugar and reduce to a minimum the cost of its production.

As indicating the wide area from whence these canes have been obtained it may be mentioned that the "elephant" cane, so called from the size it obtains under favourable circumstances, was obtained from Saigon, Cochin China; the Salangore cane is a native of the Malay peninsula, where it is highly esteemed. The Tiboo cane is also East Indian, and is a productive cane of great merit. From Mauritius there comes the Horn, the Mauritius and the Barkley canes. From Queensland, Australia, there are the Brisbane, the green rose ribbon, the Queensland, and the Hiatii, while from the Pacific Islands (probably the home of the sugar cane) there are the Lahaina, the Cuban, the Puaole, and the Ko-Kea.

When Mr. Morris was in Louisiana, in 1882, he obtained from Mr. John Dymond, of Belair estate, specimens of the Otaheite red ribbon, Java and Lahaina canes, which are now represented in this collection. The Louisiana Otaheite cane was formerly much grown in the southern portion of the United States, but it now appears to be too delicate for the climate, and it has been almost entirely superseded by the red ribbon and violet canes. The Lahaina cane was first brought to the United States by Dr. T. J. Richardson, from the Sandwich Islands, and as a proof of its authenticity Mr. Morris says that he received the same cane by way of Queensland and Mauritius a short time afterward. This Lahaina cane is described in Hawaii as being the most universally esteemed of all canes, and everywhere, excepting at great elevations, it is planted almost to the total exclusion of other varieties. This cane has yielded as much as an average of six tons of sugar per acre, on areas as extensive as 100 acres, and seven and a half tons per acre on an average over areas of twenty acres.

The Puaole cane, another great favourite in Hawaii, is called the flowerless cane, because it never tassels or throws out a flowering shoot. It is described as a soft, rich cane, yielding juice of high specific gravity and especially adapted for cultivation at high altitudes. The Cuban, or Ko Pake, in Hawaii comes next to the Lahaina. It is rich in juice, ratoons well, grows rapidly, and is entirely free from "cane itch."

In the West Indies generally the favourite canes are the Otaheite and the Bourbon. These may be said to yield the bulk of Cuban and West Indian sugars, but several others are being tried with the view of testing their capabilities for different soils and climate. As the sugar cane has lost the power of producing seed from which plants may be raised, it is now entirely propagated by shoots or pieces of the stem, which are furnished with eyes at every joint. These eyes give rise to new plants, which necessarily must be identical with the parent plant, and keep true for an indefinite period.

The importance of introducing new canes, and so testing the highest pro-

ducing powers of the land, in these days of low prices and keen competition, is self-evident. Hence this exhibit of the leading sugar canes of the world gives planters in Louisiana an opportunity which, possibly, they have never had before of seeing and examining varieties with reputations in their own country, surpassing those of any canes in this section. Of other West Indian canes Mr. Morris has the transparent, the violet, the white transparent, and the common transparent; all favourites with Jamaica planters, and the canes from which the celebrated Jamaica rum is made. Whether the quality of Jamaica rum depends alone on the manufacture, or whether it is not also due to the characteristics of the canes above mentioned, are questions not easily answered. Some maintain that the low temperature at which Jamaica rum is manufactured has a great deal to do with its fine aroma and delicate flavour; while others attribute these qualities to a peculiar property induced in the canes by soil and climate, and the presence in the rind of the canes of an empyreumatic oil not so largely developed in the canes of other countries.

The Samari cane is the favourite cane with the sugar planters in Fiji. It is hardy, grows rapidly, and yields sugar freely. Of dark-rind canes, such as violet, purple and black, there are numerous varieties, many of these such as the Egyptian and the Martinique, are admirably adapted for dry arid regions, and grow luxuriantly where other canes would fail. Others again are adapted only as fodder plants, and are often grown for that purpose when grass is scarce. The Mamuri cane, of a dusky brown colour, is certainly a strange looking cane. It would appear to be covered with a thin dry bark, which marks it at once as a distinct and specialized variety. This is a hardy slender cane, which would grow in the driest situations. Of striped canes there are very handsome specimens, such as the green, rose ribbon, and the red ribbon, which attract attention, and are likely to be great favourites with planters.

These remarks, which have been gathered from conversation with Mr Morris, will indicate the nature of this collection of sugar canes, which must be of special interest to the sugar planters of all countries gathered together at the World's Exposition.

OHLENDORFF'S DISSOLVED PERUVIAN GUANO.

LETTER FROM THE LATE DR. VOELCKER.

November 13th, 1884.

MESSRS. THE ANGLO-CONTINENTAL (Late OHLENDORFF'S) GUANO WORKS,
London Agency.

Dear Sirs,—I am in receipt of your favour of the 10th inst., and am pleased to note that you have decided to sell your Dissolved Peruvian Guano

at a reduction, and still guarantee the same high qualities as hitherto. I have no doubt that the reduction will largely increase your sales, for it appears to me a matter of great importance to the consumer to be able to buy at a reasonable price your Dissolved Peruvian Guano, which you always deliver in a uniform, finely powdered, dry condition, and of high quality, secured by a definite analytical guarantee. The stocks of raw Peruvian guanos in the United Kingdom vary so much in quality that one parcel sold at £9 or £10 per ton may be £2 or £3 too dear, while another sold at £12 or £13 a ton may be relatively cheaper.

First class guano is getting more and more scarce; and, unfortunately, when passing through the hands of unscrupulous dealers, the official analysis and the stone allowance given by the government are frequently made unfair use of as a source of extra profit to the detriment of the farmer.

Official analyses alone afford no real protection to the purchaser against fraud or unfair dealing—only a clearly defined analytical guarantee will ensure the purchaser receiving *full value for his money*.

I am, dear Sirs, yours faithfully,

(Signed) AUGUSTUS VOELCKER.

The following letter from Messrs. The Anglo-Continental Guano Works (late Ohlendorff's) on this subject, addressed to the *Barbados Agricultural Gazette and Planters' Journal*, appears in their issue for December 1, 1884:—

"In one of your recent issues we read, with much interest, your remarks
"on the present difficult position in which sugar planters find themselves
"through the unprecedented fall in the price of their staple, and fully
"appreciate the appeal you made on their behalf to bankers, merchants, and
"guano importers to do, on their part, everything possible to reduce the
"cost of production."

"It will, therefore, interest you to learn that by our recent purchase of all
"the guano cargoes afloat for account of the Chilean Government, and by
"taking upon ourselves a certain sacrifice, we are enabled, as the guano
"importers, to respond to your appeal."

"By this mail we have given our agent, Mr. E. De Mora, instructions to
"reduce the price of our Ohlendorff's Dissolved Peruvian Guano, and
"Ohlendorff's special cane manure by \$7.50 per ton."

"In announcing this important reduction, we venture, at the same time,
"to express a hope that the planters, by careful cultivation, and ample
"manuring, as well as by efficient abstraction of sugar from the cane, will
"arrive at a larger reduction at a much lower cost, and then be able to make
"a fair profit, even if prices of sugar should remain lower than they
"formerly were."

PATENT FUEL.

SAMUEL BUTLER'S PATENT PROCESS, AS WORKED BY THE CROWN
PRESERVED COAL COMPANY, CARDIFF.

Patent fuel has been manufactured for upwards of forty years. The first process was not attended with much success, the coal being mixed with liquid coal tar, and the blocks moulded and run into an oven on small waggons, where they were subjected to heat from an adjacent furnace. Some few years later experiments were made by the admixture of coal tar pitch and coal, which are the ingredients of the patent fuel now made in England, France, and elsewhere. Coal tar pitch is a black hydro-carbon made from gas-tar. It is hard and brittle when cold, but is liquid at 250° to 300° F. It burns with great heat and leaves no ash. Its properties are, therefore, most suitable for admixture with coal, as it not only serves the purpose of uniting the particles of coal into a solid block, but in burning it adds considerably to the calorific power of the coal. In order, however, to get a perfect block which will stand the trial of a long voyage with little breakage, as well as a block which will not disintegrate on the fire; it is necessary, first, that the right percentage of pitch be used, and that it is thoroughly mixed with the coal; secondly, that the whole of the mixture be heated, in order that the pitch it contains may be converted from its solid to its liquid state. Here the difficulties are met with.

There is an impression current that the manufacture of patent fuel is a simple process, requiring little or no special attention. If simply blocks are required, irrespective of quality, it may have some truth; but to make a perfectly sound block under all circumstances, which will give the maximum of heat with the minimum of breakage in shipment, has proved to be one of the most difficult tasks which have had to be surmounted in the progress of industries; the Crown Company alone having expended upwards of £50,000 in perfecting machinery.

The process adopted by manufacturers is either steam or dry heat, generally steam. By steam process it is understood that steam, either as it comes from the boilers or superheated, is injected into the mixture; and by dry heat process it is understood that the mixture is passed through the heat of an ordinary furnace.

In order to make a perfectly solid block, the mixture must not only be made as before described, and raised to the right degree of heat, but it must, when hot, be subjected to very heavy pressure—to force the hot liquid pitch into every crevice, and displace any air which may be in it.

This heavy pressure can only be applied where the fuel is free from moisture. A block which contains moisture at the time of pressure, if submitted to a very heavy pressure, will after leaving the mould generate steam internally, and force the block to pieces. This difficulty is usually overcome by using a light pressure, in which case the block is left porous, enabling the moisture to escape in the form of steam for a considerable time after it is pressed. A block made in this way will have a dull black surface, and if when broken the fracture is bright, it is the result of extra percentage of pitch, and not of pressure.

Bad quality may not only result from moisture, but in the dry heat process from too much or too little heat, which may either burn the pitch or not make it hot enough to melt, such a block will, when broken, give a dull crumbling fracture with dust.

Another difficulty, which perhaps is the greatest poser to manufacturers, is to make patent fuel of best quality which will leave a fair margin of profit at market prices. If quality is not of paramount importance, ninepence per ton may be saved by reducing the percentage of pitch 2%; this cannot be done, however, without impoverishing the block to such an extent that it will cause much breakage in shipment. We, therefore, recommend buyers to see that they get good quality. A block which has not the right percentage of pitch may look fairly well to the eye, but will give a dull crumbling fracture with dust.

A process which overcomes these as well as many minor difficulties has been patented by Samuel Butler, of Cardiff, and a licence has been granted to the Crown Preserved Coal Company. Extensive machinery has been erected which will make *900 tons per day*; one half of this machinery has been working for nearly twelve months, and the remainder has only recently been completed.

The new fuel has found so much favour that, until the additional machinery was started, a considerable number of orders had to be refused.

A good block should have polished sides, and when broken should give a sharp bright fracture. The blocks should be broken when quite cold with a bar of iron, and not with a hammer.

The Crown Preserved Coal Company, Cardiff, guarantee that every block shall stand this test, but will not take any responsibility after the fuel has been put into the ship.

MONTHLY LIST OF PATENTS.

Communicated by Mr. W. P. THOMPSON, C.E., M.S.C.I., Fel.Inst. P.A., Patent Agent, 6, Lord Street, Liverpool; and 323, High Holborn, London, W.C.

ENGLISH.

APPLICATIONS.

693. C. D. ABEL, London. (A communication from abroad by M. M. Rotten, Germany.) *Improvements in the production of sugar by the treatment of saccharine solutions with the alkaline earths.* 17th January, 1885.

865. A. G. WASS, London. *The improved utilization of sugar scum.* 21st January, 1885.

1356. C. LYLE and J. LYLE, London. *Improvements in the manufacture of lump sugar.* 30th January, 1885.

1401. H. J. HADDAN, London. (A communication from abroad by Konrad Trobach, Germany.) *Improved mode of filtering.* 31st January, 1885.

1453. H. J. HADDAN, London. (A communication from abroad by Konrad Trobach, Germany.) *Improvements in the process of extracting saccharine matters.* 2nd February, 1885.

1540. GEORGE FLETCHER and WILLIAM PRICE ABELL, London. *Improvements in centrifugal machines for drying sugar and other crystalline or granular substances.* 4th February, 1884.

1541. GEORGE FLETCHER, London. *Improvements in centrifugal machines.* 4th February, 1885.

1542. GEORGE FLETCHER, London. *Improvements in roller mills.* 4th February, 1885.

1972. C. A. DAY, London. (A communication from abroad by E. O. Foster, United States.) *Improvements in means and apparatus for bleaching sugar.* 12th February, 1885.

ABRIDGMENTS.

1669. GEORGE VALENTINE, F.C.S., M.S.C.I., Liverpool. *Improved retort for the production and revivification of animal charcoal from bones.* 18th January, 1884. This specification describes a rather complicated apparatus in which the retorts are heated by a system of gas and air mixing chambers all round the retort oven, the gas being forced in under pressure from a gas producer when the gases from the retorts are themselves passed through the furnace the retorts themselves are supplied with an atmosphere of hydrocarbon gas to prevent loss of carbon.

309775. ALBERT A. DENTON, Bavaria, Co. Saline and State of Kansas.

Apparatus for evaporating liquids December 23rd, 1884. This evaporator consists of a series of sprocket wheels, having chains geared thereto to which laths or slats are attached. As the wheels revolve the laths rise out of the syrup in which the bottom wheels dip, pass up round the top wheels, and again descend into the syrup. A constant current of warm dry air is made to circulate by fan heating pipes, &c., around and through the revolving wheels with their travelling bands of slats, drying the films of syrup that are carried upward by the slats, chains, &c.

309776. ALBERT A. DENTON, Bavaria, Co. Saline and State of Kansas. *Process of making sugar.* December 23rd, 1884. This invention consists in adding quantities of cane sugar to raw juice or syrup so as to increase its density and raise its boiling point, so as to enable all the albuminoids to co-agulate at once, instead of gradually throughout the boiling.

309826. ALEXANDER M. DOLPH and JOHN H. SLACK, Cincinnati, Co. Hamilton and State of Ohio. *Centrifugal extractor.* January 14th, 1884. This is a centrifugal driven from below. The basket is supported on a spindle oscillating with a universal joint at its driving point. The principal novelty consists in three subsidiary oscillating supporting shafts forming an oscillating tripod, carrying a ball bearing for the basket spindle half way between the main universal joint bearing, and the basket itself.

310403. CHARLES W. FRICK, Hecker, Illinois. *Evaporating pan and furnace.* January 6th, 1884. The distinguishing feature of this pan is that it is divided longitudinally into two by a wavy division, by which means two independent lots of juice can be evaporated at once, and each division of the pan can be made to take a circuitous course, each alternately meandering nearly across the breadth of the pan.

310448. HIPPOLYTE LEPLAY, Paris. *Process of and apparatus for baryta or strontia treatment of saccharine liquors, and production and recovery of these re-agents.* January 6th, 1884. Ordinary hydrate of strontia is mixed with anhydrous strontia or carbonate of strontia in the form of tubes, and is subjected in the heated state to the action of superheated steam. The resulting low hydrate is added to boiling saccharine liquor, and steam is blown in so as to form sucrate of strontia. Baryta can take the place of strontia.

GERMAN.

ABRIDGMENTS.

27029. VON ARNIM, Crieven, Schwedt-on-the-Oder. *A knife for root cutting machines, composed of separate blades.* 24th May, 1883. The single blades of the knife, which is intended for root cutting machines, with vertical knife-cutter and side filling hopper, are fastened by the aid of a band and screws upon a metal plate, the turned up edges of which receive the

blades in spaces reserved for them. If any of the blades become useless by coming into contact with stones or the like in the machine, they can be easily changed.

26087. ALFRED PERRET, Raye-Somme. *Continuous sponge filter for sugar juices, syrup, and other liquids.* 7th April, 1883. The apparatus in which the filtering liquid moves in a horizontal direction, has a row of divisions placed side by side, and separated by perforated iron plates. These divisions are filled with velvety long-haired fabrics, folded together, and with close fibred materials and sponges. The plates are placed with their upper projecting edge upon two endless chain bands, and are conveyed by them together with the filter divisions gradually towards the opening for the liquid, while the front filter divisions, after becoming thoroughly unfit for further filtration through absorption of impurities are taken out, cleansed, and again placed in the back part of the apparatus. A modification of the filter can be obtained by suspending the perforated plates obliquely, so that they form a firm division at the sides, and are covered on one side with long-haired velvety stuffs or sponges, and secured by aid of bands screwed on.

26473. MAX STREICHER, Grevenbroich, Rhine Province. *Pressure augmentor for lixiviating batteries.* 29th July, 1883. One support of the apparatus is connected with the vessels of a diffusion battery, and the other with an air pump. When the diffusers are completely closed the latter produces a vacuum in the former, which sucks in the liquid flowing in and fills the vessels quicker. When the liquid flows through the first pipe or support above mentioned the float is raised, and the piston which is in connection with the latter closes the openings, shuts off the air pump, releases the counterweight held by means of a pin, and opens the air valve. Air now rushes into the apparatus and presses down the piston, the space at the back of the piston being filled with rarefied air raises the float with the valve ball, so that the liquid which is drawn over can escape out of the apparatus. At the same time the piston closes the mouth of the support, and thereby shuts off the apparatus from the diffusers. When the piston comes to the end of its stroke it opens the air valve, and the air entering in exerts equal pressure before and behind, so that the piston again sinks and acts as before.

27129. G. HORNER, Lüben, Silesia. *Root-cutting and wash machine.* 9th November, 1883. The roots are discharged from the charging hopper formed by the sides of two graters, between the cutters of the protruding knives, which are fixed upon a hexagonal shaft, the said knives being placed at a fixed angle to each other. Rings are placed between the separate knives, and are fastened by the aid of a female screw. The knife shaft is so placed under the oblique ascending part of the grater that the knives by their rotation pass between the bars of the grater, and cut up the roots. During the cutting operation the roots are continually being pressed upwards and

turned round, and in this manner always present a different surface to be cut by the next knife, until they are sufficiently shredded up, when they fall through the slits in the grater into a vessel placed underneath. This cutting contrivance is combined with a wash drum machine of usual construction.

26802. E. SKODA, Pilsen, Bohemia. *Central ingress and egress diffuser with membrane joint.* 7th August, 1883. The joint is constructed with a movable membrane, which in the course of diffusion is pressed by the juice, or by a screw and guard protector upon a ring; so that the said ring is held close to the ring, ground conically to turn round inside it, and which is fixed in the middle of the opening and closing diffusion cover of the conducting pipe.

27118. VICTOR CLEMENT JOSEPH ORTMANS, Brussels. *Steam distributing contrivance fixed on the cone of a centrifugal for covering the sugar.* 21st June, 1883. The cone of the drum has at its lower part a chamber open below with a ring-shaped perforated steam distributing pipe, and a second chamber connected with the first by several openings. This second chamber is provided with a number of partitions, which prevent the escape of the condensing water. On issuing from this chamber the steam strikes again upon a projection, and then enters the interior of the centrifugal drum completely freed from water, and suitable for treating the sugar.

27365. PAUL PATRZEK and FERDINAND REHFELD, Warsaw. *Continuous cutting-press for beetroot, with toothed drum and spring counter-pressure.* 30th October, 1883. The lixiviated root cuttings which fall into a hopper are caught by the teeth of the rotating drum, and by the movement of the same, and the pressure of the oblique toothed fixed side and the friction caused by the perforated plate sides the water is partly extracted. In order to perfect the process of draining, a box-shaped cross-piece is fixed on the pedestal, and supported at both sides of it by springs, together with a pressing roller which is provided with a spiral spring, the cross-piece is perforated at its apex. The raspings are conveyed over these, while the cross-piece and the pressing roller yielding gradually to the oblique fixed toothed side recoil back in order to repeat anew the process of pressing. The pressed raspings are then withdrawn.

27479. FR. H. WILH. BERGMANN, Königsberg, Prussia. *Continuous centrifugal for manufacturing sugar, &c.* 22nd June, 1883. A mechanism is fixed on the drum shaft of the centrifugal designed to accelerate the rotation of the pipe surrounding the shaft during the emptying. The accelerated movement of the pipe aforesaid sets a discharged arrangement in motion, which is connected with the mechanism by gearing. This consists of a false bottom in the interior of the drum, and a double guide rack-bar which by the aid of draw-bars raises the bottom over the edge of the drum, so that the finished product is thrown into the run-off shoot.

27598. G. PRÖBER, Gutschdorf, near Gr. Rosen. *Indicator for juice elevators*, etc. 1st December, 1883. The receiver, which reaches down to the floor of the montejus, is filled with a coloured liquid. When the montejus is in operation the indicator is surrounded with juice of about 75 to 80 degrees Reamur, but when the montejus is empty the indicator is surrounded with steam of from 100 to 110 degrees Reamur. In consequence of this sudden increase of temperature the liquid in the indicator is brought to boiling point, expansion takes place in the receiver, and the liquid rises instantaneously through a glass pipe and siphon to a glass cylinder, whereby the workman sees when the montejus is empty.

Patentees of Inventions connected with the production, manufacture, and refining of sugar will find *The Sugar Cane* the best medium for their advertisements.

The Sugar Cane has a wide circulation among planters in all sugar producing countries, as well as among refiners, merchants, commission agents, and brokers, interested in the trade, at home and abroad.

CUBA.

The Havana *Weekly Report* of January 24th remarks as follows upon the sugar outlook :—It is generally anticipated at Matanzas that the crop in said jurisdiction will be smaller than calculated at the commencement of grinding operations, on account of excessive rains during the latter part of last year. According to recent advices from Sagua la Grande, the results thus far obtained leave something to desire, as, in spite of the favourable weather that has been prevailing, the density of the juice still remains between seven and eight grades, and on a very limited number of estates situated in the higher part of the locality, and where it has rained less, it reaches nine, and in a few cases ten grades."

ERRATA.

The consumption per head of population of MOLASSES was incorrectly given in our last number, page 100. The correct figures are as follows :—

1865 .. 2.14	1870 .. 2.50	1875 .. 2.58	1880 .. 0.57
1866 .. 2.41	1871 .. 2.43	1876 .. 1.47	1881 .. 0.80
1867 .. 1.50	1872 .. 2.19	1877 .. 0.94	1882 .. 0.54
1868 .. 2.75	1873 .. 1.97	1878 .. 2.09	1883 .. 1.06
1869 .. 2.70	1874 .. 0.96	1879 .. 2.41	1884 .. 1.06

THE INCREASE AND DECREASE OF EXPORT BOUNTIES

ILLUSTRATED BY THE MONTHLY IMPORTS OF FOREIGN REFINED
SUGAR INTO THE UNITED KINGDOM.

	"LUMPS AND LOAVES."													
	Monthly Average.		Jan., 1884.	Feb., 1884.	Mar., 1884.	April, 1884.	May, 1884.	June, 1884.	July, 1884.	Aug., 1884.	Sept., 1884.	Oct., 1884.	Nov., 1884.	Dec., 1884.
	1882.	1883.												
France—Reduced } bounty	3638	3538	4718	3667	3656	3644	3341	2513	2295	2166	2801	1462	924	1754
Holland—Increasing } bounty	1763	2352	2963	2821	3419	3249	4582	2456	4873	3692	3326	3560	3856	4137
Germany and Austria } Increasing bounty	513	588	314	487	387	243	810	756	569	947	279	136	645	1055
United States—New } bounty in 1884 ..	94	226	38	135	1822	1268	2757	2784	765	817	422	189	386	176
														181
														2480
														3580
														552
														962

	"OTHER SORTS," INCLUDING CRUSHED LOAF, GRANULATED CRYSTALLIZED, &c.													
	1882.	1883.	1884.	1884.	1884.	1884.	1884.	1884.	1884.	1884.	1884.	1884.	1884.	1884.
France—Reduced } bounty	1953	2477	2597	2290	2055	1720	1585	2064	1070	1288	2824	754	780	445
Holland—Increasing } bounty	1522	1853	1962	1520	1650	2239	2310	2041	1871	2121	1486	1652	1498	2104
Germany and Austria } Increasing bounty	948	1854	1893	1941	3559	1037	2282	2621	2337	1541	1278	1838	3763	5853
United States—New } bounty	101	294	83	162	976	1593	3829	7105	6932	4160	5956	3318	4153	2366
														2755
														3386

	TOTAL.													
	1882.	1883.	1884.	1884.	1884.	1884.	1884.	1884.	1884.	1884.	1884.	1884.	1884.	1884.
France.....	5591	6015	7315	5857	5711	5364	4926	4577	3365	3454	5625	2212	1704	2199
Holland	3285	4025	4955	4341	5069	5488	6892	5397	6744	5863	4815	5212	5354	6241
Germany and Austria.	1461	2442	2207	2428	3946	2180	3092	3377	2906	2488	1557	1974	4408	6908
United States	195	520	121	297	477	2861	6586	9880	7697	4977	6378	3507	4549	2542
														2936
														4348

The imports of loaf sugar from France, which during the period under review has been working with a reduced bounty, have fallen from 3638 tons, as the monthly average for 1882, to 2737 tons, the monthly average for last year. Holland, with its increased bounty, sent 3580 tons per month in 1884, against 2552 tons in 1883, and 1763 in 1882. The total imports of refined sugar from Germany and Austria have increased from 1461 tons per month in 1882 to 2932 tons in 1884. The United States, where a new bounty has been started, sent us 4348 tons per month in 1884 against 195 tons in 1882.

IMPORTS OF FOREIGN REFINED SUGAR.

The British Sugar Refiners' Committee furnish us with the following figures, giving the imports of foreign refined sugar for the month of January compared with the corresponding month of last year, and the average monthly imports for the past year compared with those of 1882 and 1883, distinguishing the quantities of "Lumps and cakes" from "other sorts," and giving the separate imports from each country:—

	" LUMPS AND LOAVES."						" OTHER SORTS," Including Crushed Loaf, Granulated, Crystallized, &c.						TOTAL.					
	Monthly Average.			Jan.,			Monthly Average.			Jan.,			Monthly Average.			Jan.,		
	1882.	1883.	1884.	1885.	1884.	1884.	1882.	1883.	1884.	1885.	1884.	1882.	1883.	1884.	1885.	1884.		
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.		
France	3638	3538	2737	2490	4718	1763	2352	3580	4916	2993	513	588	552	886	314	293		
Holland.....	1763	2352	3580	4916	2993	513	588	552	886	314	293	588	552	886	314	293		
Germany & Austria	657	319	183	185	223	94	226	962	181	38	657	319	183	185	223	94		
Belgium .....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
United States ...	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Other Countries ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Total.....	6665	7023	8014	8658	8286	6665	7023	8014	8658	8286	6665	7023	8014	8658	8286	6665		

SUGAR STATISTICS—GREAT BRITAIN.

TO FEBRUARY 14TH, 1885 AND 1884. IN THOUSANDS OF TONS, TO
THE NEAREST THOUSAND.

	STOCKS.		DELIVERIES.		IMPORTS.	
	1885.	1884.	1885.	1884.	1885.	1884.
London	94 ..	96	47 ..	50	50 ..	58
Liverpool ..	117 ..	80	33 ..	38	40 ..	41
Bristol	7 ..	6	7 ..	7	9 ..	7
Clyde	61 ..	78	34 ..	31	46 ..	47
	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>
Total ..	279	260	121	126	145	153
	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>
	Increase..	19	Decrease....	5	Decrease ..	8
	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>

SUGAR STATISTICS—UNITED STATES.

(From Messrs. Willett & Hamlin's Circular, New York.)

FOR THE FOUR PRINCIPAL PORTS. IN THOUSANDS OF TONS, TO THE
NEAREST THOUSAND. FOR JANUARY, 1885 AND 1884.

	STOCKS.		DELIVERIES.		IMPORTS.	
	Feb. 1st,		For Jan.,		For Jan.,	
	1885.	1884.	1885.	1884.	1885.	1884.
New York	51 ..	38	71 ..	61	58 ..	53
Boston	17 ..	9	13 ..	11	10 ..	8
Philadelphia....	3 ..	2	4 ..	8	3 ..	8
Baltimore .....	..	..	..	..	..	..
	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>
Total.....	71	49	88	80	71	69
	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>
	Increase..	22	Increase..	8	Increase..	2
	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>

In the case of Baltimore, where nothing is put down, it means that the Stock, Imports, and Deliveries, do not exceed 500 tons in each case.

STOCKS OF SUGAR IN THE CHIEF MARKETS OF EUROPE ON THE
31ST DECEMBER, FOR THREE YEARS, IN THOUSANDS
OF TONS, TO THE NEAREST THOUSAND.

Great Britain.	France.	Holland	Germany (Zollverein)	Four other entrepôts.	TOTAL 1884.	TOTAL 1883.	TOTAL 1882.
257	256	38	228	31	810	692	541

CONSUMPTION OF SUGAR IN EUROPE FOR THREE YEARS, ENDING
31ST DECEMBER, IN THOUSANDS OF TONS, TO
NEAREST THOUSAND.

Great Britain.	France.	Holland	Germany (Zollverein)	Four other entrepôts.	TOTAL 1884.	TOTAL 1883.	TOTAL 1882.
1098	453	46	376	310	2283	2265	2107

ESTIMATED CROP OF BEET ROOT SUGAR ON THE CONTINENT OF EUROPE,
FOR THE ENSUING SEASON, COMPARED WITH THE ACTUAL CROPS
OF THE THREE PREVIOUS SEASONS.

(From Licht's Monthly Circular.)

	1884-85.	1883-84.	1882-83.	1881-82.
	Tons.	Tons.	Tons.	Tons.
France.....	325,000 ..	473,676 ..	423,194 ..	393,269
Germany (Zollverein) ..	1,150,000 ..	986,403 ..	848,124 ..	644,775
Austro-Hungary....	525,000 ..	445,952 ..	473,002 ..	411,015
Russia and Poland ..	335,000 ..	307,697 ..	284,991 ..	308,799
Belgium	85,000 ..	106,586 ..	82,723 ..	73,136
Holland and other Countries.....	50,000 ..	40,000 ..	35,000 ..	30,000
Total.....	2,470,000	2,360,314	2,147,034	1,860,994

As compared with last month's estimate, this shows a reduction of 30,000 tons; and as compared with Mr. Litch's first estimate (see October *Sugar Cane* p. 559), the present estimate is less by 80,000 tons.

STATE AND PROSPECTS OF THE ENGLISH SUGAR MARKET.

The improvement in the sugar market, which we noted in our last report, has continued through February, and a healthy feeling is perceptible all round.

Beet 88% f.o.b., which a month ago stood at 11s. 6d. to 11s. 9d., is now 12s. prompt, 12s. 3d. May, and 12s. 4½d June.

Mr. Licht has again reduced his estimate of the European crop, 1884-85; this time by 30,000 tons; making in all, since his first estimate, a reduction of 80,000 tons; still, upon this reduced estimate, it shows a surplus, as compared with the actual crop of 1883-84, of 110,000 tons.

The crop prospects of the different cane growing countries, are, with the exception of Brazil, on the whole very favourable, and point to an increase of some ten per cent. upon last year—but it is open to doubt, unless a considerable advance in the value of sugar takes place in the meantime, whether in some cases, planters will be able to clear their crops from want of the necessary means; especially will this be so in Cuba, if the Spanish-American reciprocity treaty is not carried, and there are few, we should think, who are now sanguine enough to believe that it will be.

On the 14th February, 1885, the deliveries show decrease of 4,425 tons as compared with the corresponding period of 1884, and the imports show a decrease of 8,336 tons.

The imports of American refined for January, 1885, were 2,936 tons, against 121 tons in January, 1884.

The stocks in the United Kingdom on 14th February, 1885, were 278,654 tons against 259,759 tons in 1884, and 221,542 tons in 1883.


FLOATING.		Last Month.
Porto Rico, fair to good Refining	12/- to 12/6	against 12/- to 12/6.
Cuba Centrifugals, 96% polarization	14/- to 14/3	„ 14/- to 14/3.
Cuba Muscovados, fair to good Refining ..	12/- to 12/6	„ 12/- to 12/6.
Bahia, middling to good Brown, No. 7 to 8½	10/- to 10/6	„ 10/- to 11/6.
Pernambuco, good to fine Brown	11/6 to 12/-	„ 11/6 to 12/-.
Java, No. 14	14/9 to 15/-	„ 14/9 to 15/-.
LANDED.		Last Month.
Madras Cane Jaggery	8/9 to 9/-	against 8/6 to 8/9.
Manilla Cebu and Ilo Ilo	8/9 to 9/-	„ 8/6 to 8/9.
Paris Loaves, f.o.b.	16/9 to 17/3	„ 17/- to 17/6.
Titlers	18/9	„ 18/6 to 19/-.
Tato's Cubes	21/-	„ 21/-
Austrian-German Beetroot, 88% f.o.b. ..	12/-	„ 11/6 to 11/9.

THE SUGAR CANE.

No. 189.

APRIL 1, 1885.

VOL. XVII.

 The writers alone are responsible for their statements.

N.B.—All communications to be addressed, and Cheques and P.O. Orders made payable to HENRY THORP, Ducie Chambers, 57, Market Street, Manchester.

For Scale of Charges for Advertisements, see page xi.

For Table of Contents, see opposite the last page of each Number.

ERRATA.—*March Sugar Cane.*

“Cost of Manufacturing Sugar in Germany”—

Page 139, 12 lines from top, for “37s. 4d.” read “36s. 6d.”

“ 140, 5 ” ” ” “9s. 7½d.” ” “15s.”

“ 140, 18 ” ” ” “£800” ” “£8000.”

And in Mr. Patterson’s paper on the “Determination of Glucose in Beetroot Sugar,” page 136, bottom line, for “half per cent.” read “half c.c.”

With this number we give the first of a series of “Sugar Notes,” by Dr. T. L. Phipson. The present paper is upon Caramel. See page 173.

Mr. P. Casamajor (New York) sends us a paper “On a singular Process of Sugar Analysis,” which we give at page 191.

Mr. Wm. Russell, of Demerara, so well known as a great authority on all matters connected with cane cultivation, has recently paid a visit to some of the beet-growing countries of Europe; and in a pamphlet which he has had printed for private circulation, he gives us the result of his investigations. At page 175 we reproduce, with his permission, his “Reflections on the relative positions of Beet Sugar and Cane Sugar as produced respectively for refining purposes in Germany and Demerara.” At the time Mr. Russell wrote, the price of beet sugar f.o.b., was 10s. 6d. per cwt., and upon this basis, he estimates the loss to the manufacturer at £2 18s. 4d. per ton—upon exportation,—and the loss to the State of £1 8s. 0d., together £4 6s. 4d. per ton, this being the natural loss on Free Trade

principle—and in well-managed factories. Mr. Russell's pamphlet is a very valuable contribution to the discussion upon this important question; and all the more so, as there is, throughout, an absence of any desire to make the relative positions of the two industries other than they are, neither better nor worse.

A paper, which was read at a meeting of the delegates of the Agricultural Association of Göttingen, gives some interesting details of an enquiry, lately made, as to whether the growth of beetroots can still be considered as remunerative. It appears to have been somewhat difficult to obtain reliable details, but the judgment arrived at was, that the average cost of beet-growing in that district might be reckoned, after making a fair deduction for the occasional partial use of the leaves as fodder or manure, at from 1s. to 1s. 0½d. per cwt. That being so, and as the present prices of sugar do not allow manufacturers to pay a price for beets which will cover the cost of production, it being also impossible to give up the cultivation of these roots, which has become a part of the agricultural system of many districts, the only remedy was to reduce the cost of production. The writer goes on at some length to show how this may be done, but does not venture to give any indication as to what would be the extent of the reduction attainable, either on the average or for any particular class of farm.

We have received a letter from the editor of the *Diario de Cienfuegos*, calling our attention to an article which has just appeared in that paper on the "Superiority of Cane Sugars over Beet Sugars," with a view to its insertion in the *Sugar Cane* for the benefit of our English readers. We gladly accede to the wish; and at page 194, we give a translation of the article in question. Some of the facts and opinions advanced by the writer of it, in order to show that the polariscope is no true test of the *intrinsic* value of sugar, have previously appeared in the *Sugar Cane*, but they will bear reproducing.

Mr. Duncan, the Chairman of the British Refiners' Committee, has been calling public attention to the great difference in the freights charged by English and French railways for the carriage of sugar, as shown by the following figures:—

	Distance.—Miles.	Rate per Ton.	
		s.	d.
St. Quintin to Paris	94½	7	3½
London to Spalding	93	20	0
Valenciennes to Paris	146½	9	5¼
London to Worksop	146½	23	4
Amiens to Paris.....	80	6	5½
London to Market Harborough..	82	17	6
Arras to Paris	118	8	7
London to Newark	120	21	8

The sugar planters in the Mauritius are in no better case than their brethren in our other cane-growing colonies. *La Sucrerie Indigene*, in a recent number, speaking of the position of matters in the Mauritius, says:—

“The financial companies have only consented to make arrangements with their best customers for a limited time, namely, until the end of March, with the intention, no doubt, of reducing the figure of their advances for the future, and even of discontinuing them entirely in case a hurricane should do any considerable damage to the plantations.

“Instructions received by the last mail have induced the liquidator of the late Oriental Bank here to withdraw his assistance from the estates forming the Central Sugar Estates Company. These estates consist of two large establishments, one at Grand Port, the other at Flacq, and produce three thousand tons of sugar each. Their works are very fine. It is asserted that these properties are in excellent order and well cultivated. They have been seized and put under sequestration. A report is current that they will probably be bought by a company which is in course of formation in London.

“It seems to be doubted by many whether the colony can furnish sufficient money to keep things going from the 1st of April to the 31st December. We do not for a moment venture to express an opinion on this point. The question is undoubtedly of the highest importance. Let us reckon for a moment on the confidence which would spring from an improvement of matters in Europe, and a little also on our good star.”

The following, relating to beet growing in England, we take from *The Echo* :—

Suffolk farmers were recently told by the proprietors of the Lavenham Factory, which some months ago was opened for the manufacture of sugar from beet, that they can in future offer no more than 15s. for roots which previously fetched £1 a ton; and it now remains to be seen whether the farmer will continue the culture of a crop which promised them 20s. a ton—at which rate it would pay as well as most things—but which at 15s. would only give a net return of £7 10s. per acre. On the whole the season last year for beet culture was favourable. The cheapness of sugar is given as a reason for the reduction in the value of the root. The Central Chamber of Agriculture has discussed the question, and its decision is that beetroots cannot be remuneratively grown at 15s. a ton. The question, how-

ever, as to how far the crop is likely to prove profitable, in comparison with wheat and other things, is one which calls, not for chemical, but for practical solution.

The last remark in this extract, is in reference to Professor Church's report of the Lavenham experiment, the substance of which was given in the February number of the *Sugar Cane*, page 75.

By the sudden death, at Magdeburg, on the 10th ult., of Mr. F. O. Licht, who was in his 60th year, the sugar-world has lost one of its most prominent figures. There were no statistics, relating to sugar, which were scanned with so much interest, and, at times, looked forward to with greater anxiety, than those contained in Mr. Licht's monthly reports. If his prognostications sometimes proved wide of the result, it was simply because the situation became too complicated for *anyone* accurately to gauge it.

The *Deutsche Zuckerindustrie*, in its notice of Mr. Licht's death, says:—

"Wherever this announcement may find its way, even in the most distant sugar markets of the world, it will be read with great sympathy. Herr Licht was the first compiler of statistics in relation to sugar. As far back as 1861 he opened his "Statistical Bureau for the Beetroot Sugar industry of the Zollverein," which he very shortly extended, so as to take in statistics relating to sugar in all countries. In the earlier years he published the figures collected by him, in explanatory monthly reports, to which, since the campaign of 1867-68 he added weekly, and finally daily reports. Although it is only of late years that the sugar production of Germany has assumed a prominent position in the markets of the world, yet the reports of Herr Licht became of acknowledged importance as a standard very shortly after their appearance. Probably in no department of universal commerce, has any statistician ever occupied an equally authoritative position, and in every quarter, a highly appreciative and grateful remembrance will be preserved of the great services of the deceased."

The *Journal des Fabricants de Sucre* also contains a notice of Mr. Licht's death; after stating very much that which we have extracted from the *Deutsche Zuckerindustrie*, it concludes as follows:—

"As for ourselves, who for more than 20 years had the honour of reckoning this worthy statistician amongst our correspondents, and long ago were able duly to appreciate his circumspection and his independent spirit, we have no hesitation in respectfully recognising his merits. If now and again he happened to be deceived, this could be no reproach to him, for as regards the statistics relating to sugar, the truth is too often difficult to disentangle, and in this case more than ever we should be fully justified in repeating the well-known phrase, that he who has never made a mistake may throw the first stone. The labours of Mr. Licht will be continued by his collaborators, who will show themselves equal to their task."

SUGAR NOTES: No. I.—CAREMEL.

By Dr. T. L. PHIPSON, F.C.S., F.S.C.I., &c.

There is yet much to be learnt regarding the chemistry of sugar, and many useful derivatives will yet be discovered, but not by those who imagine they know everything, and, consequently, inquire no further.

It is astonishing with what indifference caramel is passed over in works on chemistry, and yet it is one of the most interesting products derived from sugar; but, as caramel has not been obtained in a crystalline form, it is treated with much contempt by persons of pedantic tendency, who are apt to lose sight of the usefulness of a product, and pay little attention to anything that is not susceptible of having a name a mile and a half long, and a formula that can be twisted around lozenge-shaped figures and brackets in a manner well calculated to strike the eye and confuse the mind.

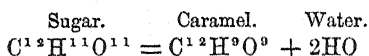
Caramel was made known by M. Peligot, a French chemist, who described it in the 57th volume of the *Annales de Chimie et de Physique*, one of the oldest and most respectable periodicals that the scientific world ever saw. Few chemists have examined caramel since, and little or nothing practical has been added to what Peligot said about it. Our cooks prepare a kind of caramel every day in the form of *burnt sugar*, which they use for colouring soups, and the commercial product is little better in quality than that which is made in the kitchen.

The temperature requisite for the production of caramel is over 200° Centigrade—210° to 220° C. may be taken as the limits. At that degree of heat the sugar swells up, turns brown, evolves steam with traces of acetic acid and an oily substance, which has a characteristic odour of burnt sugar. The result of the operation is a brilliant black product that is soluble in water, to which liquid it gives a very splendid sepia colour. This solution is quite devoid of taste.

In fact, caramel has no taste nor odour, it does not ferment, it will keep for any length of time, it has no toxic nor medicinal properties, and therefore it is *the safest and best of all colouring*

matters which have been used for tinting wines and brandies, for colouring soups, confectionery, syrups, and, in fact, all articles of food. Being of a stable nature, caramel has been much used also in chemical and physical experiments where a fixed or standard tint, or a series of standard tints of gradually decreasing shades, are required in the laboratory for the purposes of comparison.

The analyses made of caramel prove that it is derived from sugar by the loss of hydrogen and oxygen in the proportion of water :—



So that 1 equivalent of cane sugar at 210° to 220° C. loses 2 equivalents of water to form 1 equivalent of caramel. But if the heat is raised somewhat higher, more hydrogen and oxygen go off in the form of water, more traces of acetic acid and other substances are formed, and the product is impure and of less value.

Weak spirit dissolves caramel, but strong alcohol will precipitate it from its solution. At the heat of boiling water it becomes soft. When heated to a high temperature it comports itself like sugar, and by the action of nitric acid yields oxalic acid as sugar does.

An easy and rapid process for obtaining caramel on a large scale, and of the composition and properties above mentioned, has yet to be discovered. It is probable that, when this desirable object can be achieved, caramel will be applied to several other useful properties besides those already alluded to.

EXPORTS OF RAW BEET SUGAR FROM HAMBURG,

FROM JANUARY 1 TO MARCH 14, 1885.

	Tons.
To London	22,717
„ Liverpool	9,410
„ Greenock and Leith	33,134
„ Portsmouth, Bristol, and Ireland	3,230
„ France	6,264
„ Holland	4,865
„ United States	30,640
	<hr/> 110,260 <hr/>

REFLECTIONS ON THE RELATIVE POSITIONS OF BEET
SUGAR AND CANE SUGAR AS PRODUCED RESPECTIVELY
FOR REFINING PURPOSES IN GERMANY AND
DEMERARA.

By WM. RUSSELL, Demerara.

[It is of the utmost importance to our sugar colonies, to know at what price beet sugar can be sold, so as to leave a working profit. Many statements, some very absurd ones, have been made upon this point.

In order to ascertain the real state of the case, Mr. Russell, of Demerara, has recently paid a visit to the beet sugar centres of the continent, and has printed, in pamphlet form, for private circulation, the results of his valuable investigations. He sets forth the advantages and disadvantages of both the cane and the beet industries, and upon weighing them finds them very evenly balanced; still, with strict economy and the best machinery, the conclusion he has come to is,—that cane growers may yet hold their own against their formidable beet competitors.

With Mr. Russell's permission we are able to reproduce his valuable paper.—Ed. S.C.]

The present state of the sugar trade, when the smaller islands of the Antilles must give up that industry, and even the fine Colonies of Trinidad and British Guiana, with all the superior machinery lately introduced there, can not produce sugar within £5 per ton of present prices, which are, say £14 to £17 per ton in England, according to quality, has assumed a much more serious aspect than onlookers can have any idea of, because in our West Indian possessions there is no other industry which can be taken up to replace sugar-cane. Cotton and Coffee in the past had to succumb for want of labour. Under these circumstances the writer thought it good to make himself personally acquainted with the beet industry in all its bearings, and with that object in view he lately devoted some weeks to investigate the matter in the beet sugar producing districts of North Germany. After much intercourse with agriculturists, engineers, and manufacturers of sugar in its various forms, he was led to the following reflections:—

INDUSTRIOUS HABITS OF THE PEOPLE.—This must strike the most casual observer. From the dog which watches the steading by night and draws its little cartload of market produce by day, to the cow which gives up its milk in the morning, and then goes out to work on the land,—from the head of the household to the urchin who plods to school,—all are workers. In the large agricultural villages which have sprung up in many small principalities

abounding in Germany the people have allotments of land, often peculiar in outline and of limited area. In these patches one sees all kinds of produce—cabbages, potatoes, cereals, but invariably a plot of sugar beet, this being to the German, what the pig is to the Irishman, ready money; because at no great distance from these communities is sure to stand one of those huge factories for converting the roots into sugar, where ready money is paid for the roots when delivered.

LABOUR QUESTION.—This seems reduced to a very low standpoint. 1s. 6d. (eighteen pence) with potatoes, light, and lodgings for men working in the sugar factories, 11 hour spells, is a long way below West Indian rates, and for scientific men, such as working chemists, a salary of £6 per month with board is certainly under what is paid in any other country. The hinds on the farms seem well clad, and their fare, although common, keeps them in robust health. Apparently they are equally efficient with our English agricultural population.

LARGE FARMS.—These extend to about 5,000 morgens and over, say up to 3,000 English acres and over, and are conducted on sound principles, the three-shift rotation predominating, *i.e.*, one-third of the land being in cereals, and very little grass, one-third in potatoes, and one-third in sugar beet. Thus the land runs no chance of being sickened by continual cropping of one product. The straw manure, of which a large quantity is made by bullocks which are chiefly fed on exhausted beet slices, and also by the large number of work animals, is all used for the potatoe and cereal crops—the beets being manured by nitrogenous and superphosphate manures, three hundred weights of nitrate of soda and two of superphosphate to the morgen being an ordinary dose.

QUALITY AND COST OF LAND.—The heavy loam in the valleys of the Rhine, Elbe and other rivers, is considered the best for the growth of beet, and such lands sell as high as £150 per English acre. Sandy soil, of which one sees a vast extent, is worth £90 to £100 per acre, and the latter class of land, where properly manured, and with a favourable seed time with sufficient moisture to start the plants, gives excellent crops of sweet roots, this being the great desideratum in beet culture. Anything over 10 tons of roots per morgen is looked upon with disfavour by the manufacturer of sugar, as the larger the roots are the more water they contain in proportion to the sugar, and he would thus be paying duty on an extra quantity of water. In fact the manufacturer insists upon supplying the seed, it being secured from improved roots that have been selected from time to time on chemical analysis, until it is not uncommon now to find roots analysing as high as 17 per cent. of sugar against 7 to 8 per cent. when the roots were originally taken in hand as a raw product from which to extract sugar.

EXTENT OF BEET CULTURE.—The Government statistics for the 1882-83

campaign gave an average of $9\frac{1}{2}$ tons of beet-roots per morgen, which, in round numbers, gave one ton of sugar, $5\frac{3}{4}$ cwt. of molasses, and 4 tons of cattle food. Licht's forecast of the present campaign, 1884-5, puts the German crop at 1,100,000 tons of sugar; this represents 1,100,000 morgens in beet cultivation. Even this is exceeded by 50,000 tons in Licht's circular for January of this year.

FACTORIES.—These are computed at 352, of which no less than 35 new ones were erected last year, at a cost of £1,000,000 sterling. This gave rise to an extension of cultivation to the extent of beet requisite to make 145,000 tons of sugar over that of the campaign of 1883-84, which latter was 986,403 tons. Here we see that the high prices of sugar ruling for the previous two years, coupled with the increased richness of the roots and reduced cost of manufacture into sugar, and also with the improved appliances to work over the molasses, gave such a stimulus to production that, if such prices had continued for a few years, Germany would have increased the production even faster than it did for the last three years, during which it has risen by immense strides from 644,775 tons in 1881-82, to the expected crop of 1,100,000 in 1884-85.

The following calculations are based on—

A morgen = $\frac{1}{10}$ of an English acre.

A mark = 1 shilling.

A centner = 1 cwt. English.

Cost of cultivation per morgen—

Rent	marks	36
Ploughing		12
Hand Weeding		8
Artificial Manure		30
Grubbing		10
Singling and Weeding		2
Pulling and Carrying		10
Carrying to Factory		15
Discharging		2
		<hr/>
		125 shillings..

By $9\frac{1}{2}$ tons	} = 190 cwt. at 1s. 3d. stg.	237-6
of beet per		
morgen		

Farmer's profits per morgen	<hr/>	112-6 or £5 12 6.
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This seems at first sight an immense profit, but when it is taken into account that the beet-roots only cover one-third of the farm and that the other two-thirds do not do much more than pay expenses—also that no charge

is included for management, tear and wear of stock, and interest on farmer's capital, it sinks considerably. Thus the profit of £5 12s. 6d. per morgen on the beet, divided over the whole area under cultivation, gives an average all over of 37s. 6d. per morgen, or a sum about equal to the rent paid.

MANUFACTURERS AND STATE LOSSES ON EXPORTED SUGAR.

<i>Disbursements.</i> —		£	s.	d.
190 cwt. Roots, at 1s. 3d. per cwt., producing one				
ton of sugar		11	17	6
Duty on same, 9½d. do.		7	12	0
Manufacture, at 6d. do.		4	15	0
		<hr/>		
		£24	4	6
<i>Less.</i> —		£	s.	d.
Offal Crop and Draw-back.				
5·7 cwt. Molasses, at 2s. 8d. net.	0	15	2	
4·2 tons Exhausted Slices and Cake,				
Lime, &c.	1	1	0	
Drawback, 9s. per cwt. Sugar	9	0	0	
		<hr/>		
		10	16	2
		<hr/>		
		£13	8	4
Selling at 10s. 6d. f.o.b. Hamburg	10	10	0	
		<hr/>		
Manufacturer's Loss	£2	18	4	per ton.
State Loss, being the excess allowed for				
drawback on sugar	£9	0	0	
Over the amount levied for duty on Roots	7	12	0	
		<hr/>		
		1	8	0 per ton.
		<hr/>		
Natural Loss on Free Trade principle ..	£4	6	4	per ton.
To which should be added extra carriage to port of shipment, in the case of factories at a distance from Hamburg.				

It would then seem that the *present price of sugar is four pounds six shillings and fourpence per ton under the cost of production in well-managed factories*—a state of things which cannot last, however anxious the continental nations may be to kill out the sugar-cane production and so have the market in their own hands.

SUGAR FROM MOLASSES.—The 3 % of molasses on the weight of the roots contains about 50 % of sugar, and this is purchased by a new set of manufacturers who, by a chemical process recover 30 % of the contained sugar as exportable sugar, and upon this sugar, which sells in the Clyde at 8s. to 8s. 6d. per cwt. they get a draw back from the Government of 9s. per cwt. !

This is decidedly the strangest anomaly of all, and cannot be allowed to remain in force, as the fabricants are clamouring against it. It is quite true that the roots, having once paid the duty, the fabricant is at liberty to make the most out of them which well directed science indicates; but it clearly robs the revenue in a double way, for when the present fiscal tariff was arranged it was considered that 12 tons of beet would be necessary to make a ton of sugar, which, at 9d. per cwt. duty on beets, would entitle the exporter to a drawback of £9 per ton only, and that there would be $7\frac{1}{2}$ cwt. molasses to go to the distilleries, on which a revenue would be recovered. Now this is evaded, and the product is manipulated into an article worth less than the drawback allowed upon it. This drawback was maintained at £9 per ton after the duty on beets had been raised to its present figure of $9\frac{6}{10}$ d. per cwt.

GERMAN CONSUMPTION OF SUGAR.—This is given as 16 pounds per head, and the selling price in Germany is one penny per pound higher than in Great Britain, so that the tax upon the sugar beet causes a direct tax on the consumers of 1s. 4d. per annum. Taking the population of Germany at $42\frac{3}{4}$ millions at 16 pounds per head, home consumption is roughly 300,000 tons, leaving 800,000 tons for export, on which a drawback of £1 8s. over the duty collected, or £1,120,000, is paid out of the general revenue to encourage a trade which brings into Germany from abroad as the value of sugar exported, at present prices, £8,400,000: evidently the game is not worth the candle now, but when this sum is doubled and more, as it has been in the past when sugar was selling at 22s. to 23s., then there might be some excuse for encouraging this industry which gives work and wages to such a large class of the community.

We have already seen that the loss to the manufacturer on sugar exported is £2 18s. 4d. per ton, and to the Imperial Revenue £1 8s., therefore

800,000 Tons at £2 18s. 4d.	£2,333,333	loss to fabricants.
800,000 ,, £1 8s. 0d.	1,120,000 ,,	Imperial revenue.

Total National loss. £3,453,333 on exported sugar.

A tidy sum, indeed, in order to give England cheap sugar. The writer cannot think the German Government is likely to put up with this long, especially seeing they want money.

POLITICAL ASPECT.—

German population	42,750,000
Consumption, 16 pounds per head per annum	300,000 tons.
Total crop (1884-5, Mr. Licht's figures)	1,100,000 ,,
Leaving for export	<u>800,000</u> tons.

Total duty levied on beet for producing	1,000,000	
tons of sugar, at £7 12s. per ton	.....	£8,360,000
Deduct drawback, £9 per ton, consisting of:—		
Duty returned on export of 800,000		
tons at £7 12s.	.....	£6,080,000
Bounty paid by State on export of		
800,000 tons at £1 8s.	.....	1,120,000
		<u>7,200,000</u>
Receipts to Exchequer from sugar duties without		
deducting cost of collection, and after allowing		
for drawback	.....	<u>£1,120,000</u>

THE FUTURE.—With cereals pouring into Europe from the western countries, such as the United States, Canada, &c., and especially from the East Indies, with its hordes of people willing to work for the merest pittance, it seems evident that sugar beet must be the principal industry in Germany, and in fact in the bulk of the continental countries, even if all state aid is withheld. Every beet factory turning out 3,000 tons of sugar for the campaign costs £35,000, and the shares are divided over a large proportion of the population, so that certain concessions on the part of the landowners and cultivators, and also the assistance that science may confer upon the industry, will, the writer thinks, enable the fabricants to go on making a fair profit on the capital invested, and sugar will gradually rise to its normal paying price of £15 to £17 per ton for beet 88 % sugar. The important question for the West Indians is how to keep out of insolvency while the natural settling down process is going on. It is assumed that 20 to 25 % less roots will be planted for the campaign 1884-5; this, coupled to the abandonment of a large area of sugar cane, and a probable extension of consumption may bring about an equilibrium sooner than present prospects lead one to expect.

CONCLUSIONS.

On calmly considering the foregoing information, there can be no doubt left in any one's mind that beetroot sugar has stolen a march on cane sugar, and that the only way by which the makers of the latter can maintain a place in the race is to further avail themselves of everything that sound mechanical and scientific research can bring to bear on their industry. Already great strides have been made in the more advanced colonies, though few will perhaps believe that the sugar cane planters have already succeeded in recovering from the sugar cane quite as large a per centage of sugar as their opponents have done from the beet, as is shown in the following condensed table:—

BEET.	112lb.	SUGAR CANE.	112lb.
Sugar in roots	15·68	Sugar in cane	14·78
<i>By 1st Process.</i>			
1st jet	10·59	Sugar lost in megass....	4·70
2nd ,,	1·00	Sugar extracted	*10·08
3rd ,,	0·02		14·78
In molasses ..	1·50 13·11	*Viz., in crystals.....	7·26
		in molasses	2·82
			10·08
<i>By 2nd Process.</i>			
		Dry crystals.....	2·42
		In molasses	·94
			3·36
Losses	2·57	Loss in megass	1·34
	15·68		14·78

ADVANTAGES OF BEET SUGAR OVER CANE SUGAR.—The great advantages that the Continental agriculturist and manufacturer have over the Colonial are—

- 1st.—A plentiful supply of willing hands to labour at moderate wages.
- 2nd.—Short time necessary for raw products to come to maturity.
- 3rd.—Favourite crops to rotate with beet and a climate suitable for growth of cereals and potatoes, feeding of stock, &c., &c.
- 4th.—The roots of such a texture that they can be easily manipulated, while the residue is of considerable importance as cattle food.
- 5th.—Cheap fuel, with proximity to the best and largest market in the world and low freights.
- 6th.—Climate of Europe more favourable for working saccharine solutions owing to absence of ferment germs, rendering the manufacture so much more simple.

On the contrary the Colonists have to contend against :—

- 1st.—A sparse population who, in the absence of a winter and all inducement to lay by something for old age, cannot be depended upon for any continuous labour; hence necessity of importing strangers at a great cost to prosecute the sugar industry.
- 2nd.—The sugar cane takes from 12 to 16 months to come to maturity, and is accompanied by a luxuriant growth of weeds. In a tropical climate much labour is required to keep these down, and also to promote the circulation of air and allow the sun to penetrate among the ripening canes.
- 3rd.—Absence of any crops other than plantains to rotate with canes, and

as the former are perishable, and the home wants limited, they could only be grown at a loss.

4th.—The flinty texture of the sugar cane stalk and its being as yet only of value as fuel, militate against any process of manufacture that would destroy its value as such.

5th.—The nearest market in which they can purchase coals is Great Britain, and freight and charges, raise their cost to 36s. and 37s. per ton before they can be delivered at furnaces. Freight home is also high.

6th.—The necessity of manufacturing the cane into sugar immediately after being cut, as immediate deterioration sets in—all saccharine running into acidity and fermentation.

ADVANTAGES OF CANE SUGAR OVER BEET SUGAR.

1st.—A larger weight of cane can be grown on a given area of land, and at a cheaper rate than beet roots. 18 tons of sugar cane per morgen are grown with good tillage at 12s. 6d. per ton—beet costs 13s. 1½d. per ton, and produces 10 tons per morgen.

2nd.—The sugar contained in the sugar cane is of greater purity than is found in the beet, hence less loss in purification, and the finished cane sugar is on an average 6° higher in analysis, and brings in to the manufacturer at least 2s. 6d. per cwt. more, even after allowing for the extra cost of freight from Demerara, as compared with that from North Germany to this country.

3rd.—Beet sugar must be sold as made, and is often forced on the market at unfavourable times, because it suffers heavily from increase of glucose if stored, and a heavy penalty is enacted for delivery of any but fresh-manufactured beet-crystals. In Paris, at present, beet crystals of old crop are almost unsaleable.

Weighing all these pros. and cons., it is evident that the two industries are very evenly balanced, and that those of the sugar cane planters who are in a position to avail themselves of the very best appliances in manufacture might, under improved conditions of labour, look forward to times when they would hold their own against their formidable rival. One thing is evident, and that is, that strict economy must be practised in our colonies. The days when sugar at £25 to £30 could stand the enormous public expenditure which characterised some of our leading West Indian Colonies are past, and both governors and governed must be prepared to reduce taxes and expenses to the extent required for producing sugar at one-third less cost than hitherto.

Myreside, Elgin, N.B.,

12th January, 1885.

ON THE ANIMAL PARASITES OF THE SUGAR CANE.

BY HY. LING ROTH.

Continued from page 123.

PART II.

THE LITERATURE ON THE SUBJECT OF ANIMAL PARASITES OF THE SUGAR CANE.

I have, in the following list, inserted the names of the few papers on the *vegetable* parasites of the sugar cane which have come under my notice. I give the whole list as a help to those who desire to make further investigations; so that they should be in a position to see what others have done before them, and at the same time be able to compare notes. I have had considerable difficulty in making up the list, and have given some pains to make it as complete as possible.

The capitals standing to the right of the dates of the works refer to the libraries in which they are to be found, thus:—B. M., British Museum; L., Linnaean Society; P., Private Library; R., Royal Society; E., Entomological Society; and C. O., Colonial Office.

Anonymous.—*Gardener's Chronicle*, p. 122, Jan. 25, 1879, B. M.

According to the *Planter's Gazette* gives the following account of a sugar cane disease in British Honduras:—"It is stated to first appear in the form of a white froth above the roots, and that on opening up the roots the same kind of froth is seen amidst a quantity of moisture, and this in dry weather, and under a tropical sun. Maggots are bred in this froth, which develop into flies. These flies, when moving about the leaves of the cane, exude moisture from their bodies leaving stains as they progress, and where such is the case the leaves wither." The Spittle Fly belongs to the *Homoptera*.

Anonymous.—"A Day with a Naturalist." *Royal Gazette*, Brit. Guiana, 24th June, 1879, P., gives a good detailed account of the habits of the cane borer (*Proceras*) and sugar wervil (*Calandra Sacchari*).

Bancroft (Jos., M.D.)—Second Annual Report of the Board appointed to inquire in the "Causes of Diseases affecting Live Stock and Plants," presented to both Houses of Parliament. Brisbane, 1877, fol., P.

pp. 12-13.—“On Development of Sugar Cane Disease; the discovery of Fungi, Mites, and the Pou-blanc.” This useful paper is illustrated with ten figures.

Dr. Bancroft has written a paper on this subject previous to this date.

Bancroft (Jos., M.D.)—“Diseases of Animals and Plants that interfere with Colonial progress.” 14 pp., 8vo., Brisbane, 1879, P.

pp. 8-9.—Deals popularly with the fungi and acari injurious to the sugar cane.

Beckford (Wm.)—In his “Descriptive Account of the Island of Jamaica,” published in 1790, B. M., says, Vol. II., pp. 52-54:—

Yellow-blast.—“It is called yellow from its giving that colour to the leaves, and which is occasioned by large nests of insects that sap the root, relax the fibres, and bore into the substance of the canes; and from which particular property, they are called Borers.”

“The *Black-blast* attaches itself to the stem and to the leaves of the canes, is likewise an accumulation of insects; and if they be in any quantities (as I have to my loss and disappointment seen them), they will not only check, and, in a great measure, suppress their vegetation, but very severely affect the quantity and quality of the unexpected produce. I have seen many pieces together so generally covered with them, that they have (and in the course of a few days) become almost absolutely black; in which case the poor negroes are for a time blinded by the numbers which fly from every plant; and which when thus universally covered produce but little sugar, and that not only of an indifferent grain, and dark complexion, but very strongly impregnated with the same taint, both in taste and smell.”

p. 56. “In some parts of the island ‘the rats,’ I am told, have been greatly diminished, and in some part have been utterly exterminated by an ant, which is known by the name of Tom Raffles; but then I have been likewise informed that the remedy was worse than the disease.”

p. 57. “The caterpillars will, in the course of a few days, when the leaves are tender, and not more than two or three months old, eat down a very considerable field of canes; they sometimes destroy, and will sometimes act as a manure. I never knew any yield so well as some that recovered this apparent destruction.”

Bojer (W.)—“Notice on the probable cause of the phenomenon manifested in the Sugar Canes.” Trans. Royal Soc. of Arts and Sc. of Mauritius, pp. 116-123, I., 1849, B. M.:—

“The cane leaves were marked longitudinally, with light yellow lines in such a manner as to give them a ribbon-like appearance;” the leaves at the base or extremity seemed scorched. Cause supposed to be due to electricity

in the atmosphere. Planters warned not to plant affected cane tops and *not* to manure with sulphate of iron.

Bojer (W.)—Report of the Select Committee appointed for the purpose of examining the extent of the damage caused by the Cane Borer in the Mauritius:—

21 pp. 8vo., Mauritius, 1856. An invaluable account of the introduction into Mauritius of the borer (*Proceras Sacchariphagus*), its history, classification, and habits, and the remedies proposed for its extirpation. A few words are said, pp. 10 and 13, about an *acarus*, which is supposed to destroy the larvæ of the borer; also of a moth *Alucite* Lam., or *Upsolophus* Fabr., found on attacked cane. Illustrated with five plates descriptive of the insects above named.

The Sugar Cane for 1873 contains a copy of this report, but omits the most important plates, 4 and 5.

Castles (John.)—"Observations on the Sugar Ants." In a letter from J. C., Esq., to Lieut.-General Melvill, F.R.S. Phil. Trans. of the Royal Soc. of London, pp. 346-358, Vol. LXXX., 1790, R.:—

The author gives a graphic account of the destruction caused by these ants in Grenada. He says they are carnivorous, but do the harm by making their nest in the good dry shelter afforded by the roots of the sugar cane. The ants were destroyed in 1780 by a hurricane, after damaging cultivation for twenty years. Mr. Castles considers the destruction to have been brought about by the tearing up of the canes by the roots, and the consequent exposure and washing out of the nests and young ants.

Comstock (J. Henry) and Howard (L. O.), *Entomologists*—The Sugar-cane Beetle (*Ligyris rugiceps*), Le C. Report of Commissioner of Agriculture for 1880, 8vo., Washington, 1881, B. M.:—

pp. 236-240. "A stout black beetle, 17 millimetres (0.6 inch) long, boring into the stalk of the sugar cane underground." Full account of its habits, &c., and remedies proposed. With illustration (Plate II.)

On pp. 240-243 Mr. Comstock gives an account of the Cane Borer, also illustrated.

De Barry.—"Le Breton's Traité sur les propriétés and les effets du Sucre," etc., etc. Paris, 1789, B. M.

pp. 157-184. De Barry explains the presence of ants on sugar cane as due to attraction by the aphids.

Draenert (F. M.)—"Zeitschrift für Parasitenkunde," Vol. I., Iena, 1869, R. pp. 13-17. Bericht ueber die Krankheit des Zuckerrohrs. (Report on Disease in the Sugar Cane):—

After calling attention to the ravages caused by the disease, and referring to the borer and the coccus the author goes into details of the life history of a parasitic fungus. This is accompanied by a plate illustrating the fungus in various stages of growth.

(This paper has been translated by the Rev. M. J. Berkeley, and published in the Journal of the Royal Horticultural Society of London, new series, Vol. III., 1872.)

p. 212. Weitere Notizen ueber die Krankheit des Zuckerrohrs. (Further notes on the disease, &c.)

He calls attention to the fact that the fungus develops also in freshly expressed juice. Illustrated with plate.

Espeut (W. Bancroft)*—*The Sugar Cane*, August, 1878, B. M.:—

pp. 441-444. A Paper proposing the cultivation of the Bona Vista bean (*Dolichos lablab*) to attract Ichneumon flies which destroy the louse on the sugar cane.

pp. 605-7. *The Sugar Cane*, Nov., 1879, B. M.

The author publishes his success attendant on the planting of the *Dolichos lablab* and *Cajanus indicus* in and around cane fields as attracting Ichneumon flies which destroyed the louse. He then adds some notes on the habits of the pou-a-poche blanche.

Francis (Ernest E. H., F.C.S., &c.)—"On a Chemical Examination of Blighted Sugar Canes, and of the Soil in which they were grown." pp. 183-193, Vol. II., Proc. of Scientific Association of Trinidad, 1881, L.:—

The author notices the presence of a bacterium similar to the *Monos prodigiosa* Ehr. He gives the results of his analyses, but is unable to come to any definite conclusion

Fumouze (A.) and Robin (Ch.)—"Robin's Journal de l'Anatomie et de la Physiologie." Vol. IV., Paris, 1867, R.:—

pp. 505-528 and 561-601. Memoire Anatomique et Zoologique sur les Acariens (Anatomical and Zoological Memoir on the Acarina).

This includes an anatomical description of the *Tyroglyphus longior*,† as well as an account of its life history. With plate (No. 25).

Gill (W. Eathorne).—"On Cane Borer," p. 443, *The Sugar Cane*, August, 1879, B. M.:—

He considers that the ravages of insects are aided by a weakly skin, and proposes to remedy this weakness by means of certain fertilisers. [Experience, however, shows that healthy, hard-skinned canes are more subject to the borer than the thin-skinned ones.—H. L. R.]

* See page 4.

† See page 6.

Grainger (Jas., M.D.)—In his poem "The Sugar Cane," written at Basseterre, St. Kitt's, in 1763, B. M., says:—

"With bugs confederate, in destructive league,
The ants' republic joins; a villain crew.

These wind by subtle sap, their secret way;
Pernicious pioneers, while those invest,
More firmly daring, in the face of heaven,
And win, by regular approach, the cane."—*Book II.*

Guilting (Rev. Lansdown, B.A.)—"Insects Infesting the Sugar Cane." pp. 143-153, Transactions of Society of Arts, Vol. XLVI., 1828, R. :—

Gives classified (Latin and English) description of the cane and palm weevil (*Calandra Sacchari* and *Calandra Palmarum*) and cane borer (*Diatraea Sacchari*). With an account of their destructive habits, and three plates. (In the Library copy of the Society of Arts the plates are coloured.)

For this invaluable paper the author was presented with the gold *ceres* medal of the society.

Corrections of Mr. Guilting's paper on "Insects that Infest the Sugar Cane." pp. 192-199 Transactions of the Society of Arts, Vol. XLVII., 1829, R.

Besides corrections, this contains some account, with description of larvae, of the *Sphinx labruscae*, Fabr., and of a moth unknown.

Hooker (Jos., Sir.)—Report on the "Progress and Condition of the Royal Gardens at Kew during the year 1877." 8vo., London, 1878, L. :—

Pp. 37-39.—"Sugar Cane Disease." This paper is a valuable and concise summary of all that is known of the rust disease and the apparent accompanying parasitic fungi, acari, and the coccus. It gives the views of Dr. Bancroft, the Rev. M. J. Berkeley, Mr. Broome, Mr. McLachlan, F.R.S., Mons. Signoret, Mons. E. Icery, and Prof. Liversidge.

Edition 1879, L. :—

p. 48 states that according to Mr. McLachlan, some acari sent from Queensland looked very like a *Tyroglyphus*, but doubtful, and on the same authority, that the *pou à poche blanche*, also from Queensland were undoubtedly the same as the Mauritian *Icerya sacchari*.

Horne.—pp. 131-132.—Journal Royal Horticultural Society of London. New series. Vol. II., 1870, R.

Some observations on a disease affecting sugar cane in the Malayan peninsula. The disease starts by the withering of the tips of the older leaves, and general decay follows without any visible (microscopical) cause.

Hughes (Griffith, Rev.)—"The Natural History of Barbados." Fol., London, 1750, B. M.:—

pp. 245-247.—On the yellow blast on the sugar cane, supposed to be due to the larvae of small moths. The author also discusses the presence of ants among sugar cane.

Icery (M. E., Dr.)—Memoire sur le Pou à Poche Blanche présenté à la Chambre d'Agriculture de l'île Maurice," par M. E. I. 8 pp., 8vo., Ile Maurice, 1864, L.:—

A full account of the life history of the Pou à Poche Blanche (waxy sugar cane louse), with six large plates to illustrate the text. A most useful work for planters. This insect was discovered by Dr. Icery.

Liversidge (Arch., Prof.)—"Disease in the Sugar Cane." Sydney, 1876, B. M.:—

p. 15. "On stripping off a leaf from the cane, there is usually to be seen under the leaf scroll, and near to the bud a patch of dark red brown or purple matter; this, on close examination with the aid of a lens or microscope, is seen to be resolved into a number of minute, more or less cuplike bodies, each with an irregular rim or opening; the opening or mouth is often partially closed by flaps, and then it is usually roughly triangular in form. These little cups are connected together by dark red and purple filaments, which spread over the surface and penetrate into the substance of the leaf; many are seen to pass completely through its substance by the presence of corresponding red or rusty brown spots on the opposite surface. Some of the filaments appear to bear spores." He compares this fungus to the *accidiacei*.

p. 17. "Feeding upon the accidiacei numerous minute acari were seen, white in colour and almost transparent. Along with them were beautifully symmetrical, equally transparent oriform bodies, which are probably the acari in an undeveloped stage."

The Professor does not consider the disease a specific one, but that the unhealthy condition of the plant to be due to unfavourable conditions of growth.

Michael (Albert D.)*—"Observations on the Life Histories of the Gamasinae," with a view to assist in more exact classification, with plates. pp. 297-309, Jour. Linn. Soc., XV., 1881, L.

Ormerod (Miss E. A.)—On "Cane Borers." pp. 15-20. Proceedings of Entomological Society, of London, for 1880, E.

* See page 6.

The author called attention to the destruction caused by cane-borer beetles and moths, and mentions that the application of chemicals was scarcely practicable, but that the removal and cutting out of infested tops and cuttings tended to diminish the presence of the insects. She spoke of the usefulness of destroying refuse cane. She laid emphasis on the protection of natural enemies, especially the ants. She quoted somewhat from Mr. W. Bojer's paper on the Borer in Mauritius, and then gave some details of the habits of the moth.

Schomburgk (Rob. H. Sir).—In his History of Barbadoes, London, 1848, B. M., refers on pp. 640 to 648 to the ants, borers, and other insects, destructive to the sugar cane:—

The sugar ant *Formica omnivora*, Linn. and *Myrmica omnivora*, Latr. Probably the ant described by Castles (which see) and also spoken of by Herréra (Dec. ii, 3-14) and Dr. Coke (West Indies, Vol. II., p. 313,) as so destructive to vegetation as almost to drive out the inhabitants. He quotes also Dr. Pohl and V. Kollar: "Braziliens vorzueglich-laestige Insekten. The cushi or great-headed ant *Formica cephalotes*, Fabr. This ant i. vegetarian and devours the leaves. The sugar ant *Formica Saccharivora* which gets at sugar. (For Borer and Cane Fly, see Guilding and Westwood.)

Wallet (L. L.).—"Disease of the canes on the Estate Gros Bois." Trans. Roy. Soc. of Arts and Sc. of Mauritius, pp. 148-9, Vol. I., 1849, B. M.:—

After very windy weather the leaves of many tops of cane were so twisted as to prevent growth, and to cause the buds to start. The canes look as though burnt, and this state is attributed to excess of moisture.

[The twisting of the cane tops and subsequent rotting is of common occurrence.—H. L. R.]

Westwood (J. O., F.L.S.).—"Notice of the 'Borer,' a caterpillar very injurious to the sugar cane." Pp. 102-103, Vol. I., Jour. of Proc. of Linn. Soc., 1857, L.:—

An account of the *Proceras Sacchariphagus*.

Westwood (J. O., Prof.).—Journal of Proc. of Entomological Soc., London, pp. 55, II, 1864, E:—

In speaking of the Memoire on the coccus by Dr. Icery, the Professor "remarked that it was perfectly clear, from the description and from the plates, that the insect which Dr. Icery supposed to be the male of the coccus was not a coccus at all; it was a species of *Coccophagus*, a Hymenopterous (Chalciditic) parasite upon coccus. The female described was doubtless a true coccus, the male of which was, he presumed, still unknown. The action

which the author had mistaken for the impregnation of the female coccus was, in fact, the deposition of the eggs of the female *Coccophagus* in the body of the coccus."

Westwood (J. O., Prof.)—A Notice of the Ravages of the Cane Fly; a small winged insect, including some Facts on its Habits: by a Subscriber, in Grenada; with additional observations by Prof. Westwood.

pp. 407-413 *Mag. of Nat. Hist.*, vi., 1833, E.

This is an account of the Sugar Cane Spittle Fly (*Delphax sacch.*) Its habits are described and Prof. Westwood classifies it; with woodcut.

p. 496 *Mag. of Nat. Hist.*, vii., 1834, E.

Information on the Cane Fly of Grenada (*Delphax saccharivora*), additional to that given in Vol. vi., pp. 407-413.

Contains corrections and additions to previous paper.

Westwood (J. O., Prof.)—Report of the Committee, etc., for investigating the nature of the ravages of the Cane Fly, *Delphax saccharivora*, in Grenada. 2 pp. fol. London, 1834.

The above title is extracted from p. 263 Hagens Bibliothica Entomologica, Leipsig, 1863, E.

Westwood (J. O., Prof.)—The Cane Borer, p. 453, *Gardener's Chronicle*, 5th July, 1856, L.

A full account of the *Proceras sacchariphagus*, with woodcut, based on a report of a Mauritius Committee appointed to investigate the matter. Prof. Westwood proposes remedies and points out that this borer is probably identical with the *Diatraea Sacchari* of Guilding, and the *Phalaena Saccharalis* of Fabricius.

In 1850 the Royal Society of Arts and Sciences of Mauritius possessed several coloured drawings representing the sugar canes in different states of disease.

In his Kew Report for 1877, Sir Joseph Hooker mentions that "Diseased sugar cane sent from Natal proved to be effected with sugar 'cane smut' (*Ustilago sacchari*), an analogous disease to the smut of wheat and maize."

HENRY LING ROTH.

48, Wimpole Street, London, W.,

February 16, 1885.

ON A SINGULAR PROCESS OF SUGAR ANALYSIS.

BY P. CASAMAJOR.

Some dozen years ago there appeared, in the *Journal des Fabricants de Sucre*, a letter signed "Un Abonné," calling attention to an empirical process of sugar analysis, used by Parisian sugar testers. This communication was the occasion of denials of its truthfulness by several sugar testers, and also of counter-statements by chemists who confirmed the accuracy of the statements of "Un Abonné."

I have reason to believe that such a process was used pretty generally at that time, because, having occasion, shortly after the appearance of the letter of "Un Abonné" above mentioned, to test several marks of a cargo of raw beet sugar from France, I found that the tests by the empirical process there given agreed more closely with the tests made in Europe than those obtained by the optical saccharometer.

This empirical process is called "Process of the $\frac{3}{4}$." To test a sugar by it the water is determined by evaporation, and the ashes by incineration, after addition of sulphuric acid. These are the only tests actually made. They require a very small outlay for apparatus. The return of the analysis of a sugar is made on a blank of this form:

Sugar	
Glucose	
Ashes	
Water	
Organic matters, not saccharine and loss ..	

 100

To fill up this blank, the water and the ashes are first put down as found by actual tests. The other constituents are obtained by what may be called *guessing*, within prescribed rules. To get at "organic matters, not saccharine, and loss," the sugar tester takes $\frac{3}{4}$ of the quantity of ashes as determined by actual test, and hence the name of " $\frac{3}{4}$ process," after which there only remain "sugar" and "glucose" to fill up, and these are easily got. Beet sugars contain very little glucose (invert sugar), so no serious mistake can occur in guessing at this. The sugar tester, however, is guided by the colour

of the sugar. If this is dark, compared to most beet sugars, the glucose is estimated at about $\frac{3}{4}$ of 1 per cent. If the sugar is light, glucose is put down at about $\frac{1}{10}$ of 1 per cent. Intermediate colours give intermediate percentages of glucose. As the quantity is never very great, no important mistake can be made in the item of glucose.

As to the item which figures as "sugar" it is very easily obtained by adding up all the others and subtracting the sum from 100.

Take, as a numerical example, a beet sugar having 3 per cent. of water and $2\frac{1}{2}$ per cent. of ashes. According to what has been said, the analysis would be given as follows, supposing that the colour of the sample justified guessing that glucose was equal to 0.3 per cent.

Sugar	92.20
Glucose	0.30
Ashes	2.50
Organic matter, not saccharine and loss....	2.00
Water.....	3.00
Total	100.00

To understand how such a process could ever have come into use, we must remember that most raw beet sugars are of very high grade compared to the generality of raw cane sugars. After deducting water and real sugar, as ascertained by actual analysis, the remainder is comparatively a small percentage. If now the ashes are found generally to be about $\frac{2}{5}$ of the total remainder, it is conceivable that a process like this may give in most cases results which are satisfactory to the buyer and to the seller.

But there remains something else to be considered in relation to this process: It is that beet sugars are sold on the basis of *rendement*, formed on the assumption that 1 per cent. of ashes prevent the crystallization of 5 per cent. of sugar. Now, in the numerical example given, the sugar being stated at 92.20, we would have to deduct $2\frac{1}{2} \times 5 = 12.50$ from 92.20, to obtain, as *rendement*, 79.70 per cent. In doing this we have actually done the same thing as taking the water (equal to 3 per cent.) and glucose (0.30) from 100, which leaves 96.7. Now we take the ashes ($= 2\frac{1}{2}$), add $\frac{2}{5}$ as much, and get $2.50 + 2 = 4.50$. We now multiply the ashes by 5 (2.50×5) and get 12.50, which added to 4.50 makes a sum equal to 17. This, deducted from 96.70, leaves as *rendement* 79.70, the number already given. To obtain it we have deducted from 100 the following quantities:—

Percentage of water, as determined	.. .. .	3·
„ glucose, guessed at	.. .. .	·30
„ ashes multiplied by $6\frac{1}{2}=2\cdot50 \times 6\cdot8$		17·
		<hr/>
		20·30

The percentage of ashes is incomparably the most important element in a sugar analysis by this process.

In the way that a chemist is expected to make a sugar analysis, he is to determine the sugar by the optical saccharimeter, the water by evaporation, and the ashes by incineration.

Indeed the water is of no importance and may be left out of the ordinary commercial analysis. From the sugar as given by the saccharimeter, the sugar tester deducts five times the weight of the ashes. The result is the *rendement*. If the sugar should be found to be 92 per cent. and the ashes 2·50, the *rendement* would be 92— $(2\cdot5+5)=79$ per cent. It is on this number, 79, that the sale of beet sugar is based in all European Markets, which is a fact of itself more extraordinary to me than the $\frac{2}{3}$ process. The “co-efficient 5,” which is generally accepted, is based on nothing but assumptions which have no foundations. Those who are willing to buy and sell by the “co-efficient 5” need find no fault with the $\frac{2}{3}$ process.

My attention has been called to a description of the $\frac{2}{3}$ process in Wurtz, *Dictionnaire de Chimie*, III., p. 67. After describing Clerget's process, the author of the article says: “Depuis un certain temps, pour éviter un dosage aussi long, on employe, dans les laboratoires, un procédé beaucoup plus simple et qui donne des résultats à peu près exacts.” Then follows a brief description of the $\frac{2}{3}$ process.

THE LARGEST VACUUM PAN EVER CONSTRUCTED has just been made for a San Francisco sugar refining company. It is a pear-shaped vessel, made from sections of cast iron. It is seventeen feet in diameter inside, reaches a height of over forty feet, and will weigh 140 tons when empty. It will boil 100 tons of sugar at once. It contains sixty coils of four-inch copper pipe, arranged in the form of a hollow inverted cone, providing 3,000 square feet of heating surface. To carry off the steam, four openings, 10 inches in diameter, are provided for connecting with the vacuum pumps, and a constant stream of water that fills a ten-inch opening is needed to absorb the heat of evaporation.—*American Grocer*.

SUPERIORITY OF CANE SUGAR OVER THAT OBTAINED FROM BEETROOT.

THE POLARISCOPE NOT A TRUE TEST OF THE SWEETING POWER OF
SUGAR.

From the *Diario de Cienfuegos*.

We assert that we can demonstrate theoretically and practically that sugar obtained from the cane is from 25 to 35 per cent., as the case may be, sweeter than that obtained from beetroot of equal grade, and that, consequently, it ought to be worth 25 to 30 per cent. more in all markets than beetroot sugar, because sugar is used as a bromatological article, expressly for the sweetening of different articles of food, both liquid and solid. This assertion we now proceed to prove.

Chemists apply the name of sugar to certain substances which, under the influence of water and some fermenting agent, undergo fermentation, and are transformed directly into alcohol and carbonic acid. Chemically, pure sugar is represented by the formula $C_{12}H_{11}O_{11}$, which is equivalent to 42.10 of carbon, 6.43 of hydrogen, and 51.47 of oxygen.

On the basis of this analysis, the chemist Chaptal committed the error of saying, many years ago (which excuses the fault), "that sugars obtained from various plants are absolutely of the same nature, and do not differ in any way when refined or pure, and that their taste, crystallisation, colour, and weight are absolutely identical."

Apart from the fact that even the best refined sugars, when brought into consumption, are not chemically pure, Chaptal says nothing with respect to the degree of sweetness, which is precisely the point which is of most importance; but, even as regards crystallisation, his view is quite erroneous. The crystals of beetroot sugar, both refined and unrefined, are longer than those of cane sugar, and from this very cause absorb more light. Further, in the beetroot crystals we observe, at short intervals, dark stains, which are not seen in the crystals of cane sugar. And the illustrious Pasteur, whose authority no one can question, says that "the long crystals are impure, and short ones, like those of the cane, indicate purity." In fact, the degree of sweetness in sugars depends on the size of their crystals.

Cane sugar shows shorter and thicker crystals, and is sweeter; that of beetroot has them longer and thinner, and is less sweet; and in the sugar obtained from other matters the crystals are always longer and thinner than those of beetroot, and it is, consequently, much less sweet than that obtained from the latter. The assertion of Chaptal cannot therefore be accepted. Cane sugar is not the same in its crystallisation as other sugars, and its sweetness is notably superior to that of all these. Let us investigate the cause of the mistake.

At first sugars were sold in the markets by colour, the standard adopted in comparing them being that called Dutch standard, which was undoubtedly a very rudimentary means of calculating the value of sugar. On the discovery of the properties of the polariscope it was at once applied to grade sugars, the instrument, since generally known by the name of polarimeter, being constructed. This application was, however, quite incorrect, because in sugars of different sorts the polarisation is in inverse ratio to the saccharine strength. After studying the problem, chemists have obtained the following results*:

	Polarisation.	Sweetness.
Sucrose (cane sugar)	100°	100°
Betose (beetroot sugar)	103°	70°
Dextrose (starch sugar)	147°	40°

From which it results that cane sugar of 100° polarization in the polarimeter has 100 parts of sweetness, while beetroot sugar of 103° has no more than 70 parts; and starch sugar, with the enormous polarization of 147°, has only 40 per cent. of sweetness.

However, practical observations are completely in agreement with science, because wherever in consumption, regular quantities of cane and beetroot sugar have been used alternately, the remarkable

* These figures agree with those given by the writer of the paper on "The Future of the British West Indies," which appeared in *The Sugar Cane* for March, 1883, page 117. In this paper, as also in the previous one (February, 1883, pages 77 and 78), the writer combats the opinion of the United States' Commissioners on the sugar duties, that "the polariscopic test, "in the first place, enables us to assess a specific duty; in the second "place, it is *ad valorem*, because it is fixed upon the value of the sugar by "polariscopic strength, *which is its value for sweetening, and that value is "determined by the polariscope.*" We would recommend a perusal of these two papers in connection with the present article.—ED. S. C.

difference which exists between these sugars has been noted. The superintendents of large scholastic establishments, of charitable institutions, manufacturers of confectionery on a large scale, finally, all those who have had the opportunity of using these two classes of sugars at different times, know well, that refined cane sugar is 25 to 30 per cent. sweeter than refined beet sugar. Refiners are not ignorant of this, and have resorted to a great extent to the dodge*

of mixing the two classes, by which means they frequently throw the consumer on a small scale off the scent; but they are quite aware of what they are doing, gaining an advantage in price, because they always pay less for the same grades of raw beetroot sugars than for those of cane.

It being shown scientifically and practically that cane sugar is from 25 to 35 per cent. sweeter than beetroot sugar in all their grades, it presses on us as an inevitable necessity to replace the polarimeter, which hitherto has been used incautiously, by another instrument more rational and more fit to determine exactly the quantity of sweetness which each kind of crystallised sugar contains, because this article is used exclusively to sweeten different substances.

We are aware of the difficulties which present themselves in the construction of an instrument which shall be handy and accurate, and will test correctly the degree of sweetness in any saccharine solution; but it is not impossible, but far from impossible, having at hand, as we have, bitter substances, such as the bark of the willow, the oak, the horse chestnut, angostura, cinchona, etc., which can be made use of easily to produce the neutral line, which will serve as a basis for the future glycometer, or measurer of sweetness, which is so much wanted in the world of sugar.

* The word in the Spanish is "Estratagema." Our author falls into the error, which other writers have also committed, of supposing that our refiners, in using beet sugars, do so in order to pass off as a superior article that which is an inferior one—a most unjustifiable inference. Everyone knows why sugar is now so cheap, and everyone knows, who thinks, that a large proportion of the sugar consumed in Great Britain must be made wholly or partially from beet, seeing that one-half of our sugar imports at the present time consist of beet sugar.—ED. S. C.

COMPOSITION OF MAPLE SUGARS AND SYRUPS.

By H. W. WILEY,

Chief Chemist, Department of Agriculture, Washington, D.C.

Lately Dr. H. C. Bolton, of Trinity College, Hartford, Conn., wrote to me for information on the composition of maple sugars and syrups. I was surprised to find almost no data of this kind in chemical literature. I was led by this paucity of recorded analyses to secure samples of sugars and syrups, which I have had analysed by the Bureau of Chemistry of the U.S. Department of Agriculture.

In a paper read at the Saratoga Meeting of the American Association for the Advancement of Science, and published in volume xxviii. of the Proceedings, I showed that in pure maple sap there is no trace of any reducing sugar. All the sugar present is pure sucrose. Twenty-eight analyses of the fresh sap gave a maximum content of sucrose of 4.30 per cent., and a minimum of 1.87. The average per cent. sucrose for the 28 analyses was 2.82 per cent.

Inasmuch as the maple sap is always evaporated in open pans, it is not strange that the sugars and syrups contain invert sugar. On the other hand, in many cases the percentage of invert sugar is surprisingly low. These cases indicate that in pure aqueous solutions of sugar heat does not invert the sucrose as rapidly as if mineral salts and organic impurities are present. A study of the proportion of inversion due to heat and to other causes would be of interest. Samples for analysis were purchased in open market, and directly from retail manufacturers. Opportunity was thus afforded to compare the genuine with the commercial articles.

The results of the analyses, presented in the following tables, show to be true what has long been suspected, namely, that the commercial articles are largely adulterated. The commercial syrups are quite uniformly mixed with starch-sugar, or glucose. No method of analysis, however, will detect a kind of adulteration, which is probably common, that of the addition of cane or beet-sugar to the maple. All of these sugars are identical chemically.

Of the syrups, Nos. 14 to 20, inclusive, are known to be genuine. Excluding from these No. 15, which had been made for more than a year, and had undergone, undoubtedly, partial fermentation, it is seen that the sucrose varies from 39.22 per cent. to 64.45 per cent. The invert sugar (glucose), on the other hand, varies from 0.21 per cent. to 3.24 per cent. The percentage of water is, as an average, astonishingly large, over 30 per cent.

Of the sugars, Nos. 15 to 20, inclusive, are known to be genuine. In these the sucrose is quite constant, about 84 per cent., while the invert sugar varies between 0.80 and 5 per cent. The water is much higher, too, than one would expect.

MAPLE SYRUPS.

No.	Sucrose by double polarisa- tion.	Invert- ose.	Water.	Ash.	Un- deter- mined.	Total.	Description and Remarks.
1	50.49	9.90	32.39	0.23	6.89	100.00	Thurber's mountain syrup, quart bottles, bought in Washington, D.C.
2	22.94	27.77	25.06	0.68	23.65	100.00	Vermont maple syrup (McClary), quart bottles, bought in Washington, D.C.
3	63.57	trace	31.52	0.69	4.22	100.00	Vermont syrup, kept in bulk, bought in Washington, D.C.
4	57.94	5.52	29.14	0.44	6.96	100.00	Do.
5	61.25	trace	29.68	0.74	8.33	100.00	Do.
6	32.07	32.79	19.01	1.00	15.13	100.00	Western Reserve (Block Bros.), half-gallon cans, bought in Washington, D.C.
7	57.71	3.24	31.34	1.14	6.57	100.00	Western Reserve (Block Bros.), kept in bulk, bought in Washington, D.C.
8	61.41	1.58	28.72	0.82	7.47	100.00	Hazen's Vermont syrup, quart bottles, bought in Washington, D.C.
9	63.78	2.00	26.69	0.84	6.69	100.00	Ohio syrup, from Mr. LaDow, Washington, D.C.
10	49.46	17.24	33.98	0.38	—	101.06	Ohio syrup, kept in half-gallon cans, bought in Washington, D.C.
11	29.41	17.57	33.66	0.86	18.50	100.00	Do.
12	64.26	0.66	31.28	0.74	3.06	100.00	Hazen's Vermont syrup, in quart bottles, bought in Washington, D.C.
13	44.54	16.00	40.26	0.79	—	101.59	Syrup made from butternut tree, from Franklin B. Hough, New York.
14	62.23	0.21	35.21	0.55	1.80	100.00	Maple syrup, from Franklin B. Hough, New York.
15	42.09	17.54	33.74	0.95	5.68	100.00	Maple syrup made in 1883, from M. J. Smith, Middlefield, Mass.
16	54.80	3.24	38.58	1.03	2.35	100.00	Maple syrup made from last run of sap in 1884, from M. J. Smith, Middlefield, Mass.
17	63.87	1.39	32.11	0.71	1.92	100.00	Maple syrup made in middle of season, 1884, from M. J. Smith, Middlefield, Mass.
18	64.45	1.39	31.67	0.76	1.73	100.00	Do.
19	62.90	1.78	32.84	0.68	1.89	100.00	Maple syrup made early in season of 1884, from M. J. Smith, Middlefield, Mass.
20	39.22	1.79	36.72	0.94	21.33	100.00	Maple syrup made in 1883, from M. J. Smith, Middlefield, Mass.

MAPLE SUGARS.

No.	Sucrose by double polarisa- tion.	Invert- ose.	Water.	Ash.	Un- deter- mined.	Total.	Description and Remarks.
1	84.24	6.33	8.03	0.31	1.09	100.00	In bulk, bought at Washington, D.C.
2	81.67	9.26	8.84	0.97	—	100.74	Do.
3	79.08	6.02	11.57	0.91	2.42	100.00	Do.
4	71.80	12.19	9.73	0.70	5.58	100.00	In small cakes, bought at Washington, D.C.
5	86.27	5.91	6.77	0.76	0.29	100.00	Do.
6	86.52	trace	8.63	1.06	3.79	100.00	In bulk, bought at Washington, D.C.
7	80.22	6.89	8.68	1.30	2.91	100.00	Do.
8	86.24	4.54	7.82	0.41	0.99	100.00	Do.
9	84.58	1.11	9.74	0.96	3.61	100.00	Do.
10	84.51	3.22	8.24	1.26	2.77	100.00	Do.
11	85.42	0.87	8.78	0.67	4.26	100.00	Do.
12	84.14	6.57	7.47	0.49	1.33	100.00	Do.
13	85.68	0.43	10.81	1.21	1.87	100.00	Do.
14	85.13	2.23	6.83	1.50	4.31	100.00	Do.
15	84.72	0.80	9.53	1.21	4.54	100.00	Sugar made early in season of 1884, about March 20, from M. J. Smith, Middlefield, Mass.
16	82.36	2.10	10.75	1.25	3.54	100.00	Sugar made early in season of 1884, from M. J. Smith, Middlefield, Mass.
17	86.97	1.69	7.68	1.06	2.60	100.00	Do.
18	86.28	2.10	7.59	1.27	2.76	100.00	Do.
19	86.89	2.08	7.96	1.06	2.01	100.00	Sugar made from the last run of sap in April, from M. J. Smith, Middlefield, Mass.
20	82.07	5.00	9.26	1.16	2.51	100.00	Sugar made from the last run of sap in April, in bulk, from M. J. Smith, Middlefield, Mass.

Some curious results are shown by the above analyses. Notice, for instance, the difference in syrups Nos. 2 and 3, 4, 5. In case of No. 2 the analysis clearly reveals a large addition of glucose. Nos. 3 and 4 had only a trace of reducing sugar. This is also suspicious. It shows that the samples were made, probably, by adding to a syrupy solution of cane sugar enough dark maple syrup to give it colour and flavour. It is difficult to suppose that a maple sap evaporated to a thick syrup on an open pan would contain only a trace of reducing sugar. No. 4 is a genuine maple syrup.

In Nos. 9 and 10 are also found some interesting data. Both of these syrups are probably genuine, although differing so greatly in composition. If No. 10 is an adulterated sample the admixture is not glucose, but refining molasses. In glucose there is always dextrin and maltose, which were not determined above. In No. 10, therefore, there can be no glucose, else it would partly appear in the undetermined column. On the other hand, the percentage of reducing sugar is very high, indicating a possible addition of refining molasses; but the low percentage of ash in this sample is an evidence of its purity.

In No. 13 is found a sample from the butternut tree (*J. cinerea*). The sap of this tree, taken in early spring, is scarcely inferior to that of the maple.

Unhappily there is no method of detecting the adulteration of maple-sugar with other sucroses. The temptation to this adulteration is great, because maple-sugar commands nearly double the price of other sugars; but neither chemistry nor optics will help to a decision in a question of such an adulteration. If enough of the real maple-sugar is present to give the characteristic odour and flavour the sample must pass.

Lately in the United States a patent has been secured for manufacturing the maple flavour. It is done by extracting hickory bark with water, and the separation and purification of the product. This extract added to glucose or cane-syrups gives them an odour and flavour very like the maple.

EXPORTS OF BRITISH REFINED SUGAR

FOR JANUARY AND FEBRUARY, 1885, 1884, AND 1883.

	1885. Tons.	1884. Tons.	1883. Tons.	1885. Value. £	1884. Value. £	1883. Value. £
Belgium	574	782	736 ..	6,965	14,533	14,984
British North America	188	388	303 ..	2,150	6,568	5,397
Denmark	988	1,762	1,514 ..	14,999	32,401	36,517
France	891	1,881	917 ..	12,435	36,106	19,436
Italy	1,600	2,024	2,025 ..	20,962	40,532	44,362
Portugal, Azores, & Madeira	774	1,065	273 ..	10,660	19,089	5,824
Other Countries	3,529	3,164	2,854 ..	50,019	62,889	62,711
	8,544	11,066	8,622	118,190	212,118	189,231

LOUISIANA SUGAR INDUSTRY.

A GLOOMY OUTLOOK, AS VIEWED BY A LOUISIANA SUGAR PLANTER.

[The following report from a sugar planter in Louisiana, who is also acquainted with the state of things in Germany, appears in a recent issue of the *Deutsche Zuckerindustrie*; it will be well to bear in mind that the state of things here depicted is in spite of a protective duty, which is equal to 1d. per lb.:—]

“It is scarcely to be expected that the production of sugar, which has increased to such an enormous extent from year to year, will come to a sudden stop, or even retrograde in Germany and Austria. The cultivators of the soil have adapted their arrangements to the sugar industry, and can only be prejudiced by any sudden change. Only a comparatively insignificant portion of the sugar, produced is consumed in Germany or Austria; both countries are therefore compelled to export.

The time appears to be near at hand, when one of the two kinds of sugar must gain the upper hand in the world's market, whilst the other will perhaps have to disappear altogether from the scene. It is therefore of the greatest importance to manufacturers of beetroot sugar to become acquainted with the circumstances and position of the two greatest sugar-consuming countries; these are Great Britain and the United States.

The state of affairs in Great Britain may be considered as tolerably well known; not so those of the United States. The question of the production of beetroot sugar both in the United States, and in Canada, may be considered as settled. The single manufactory which exists at Alvarado, in California, will be compelled to come to a standstill, the moment Claus Spreckles loses the monopoly on the Pacific coast, and prices of sugar in that quarter fall from the present artificial point to a normal basis, *i.e.*, the prices of the New York sugar market, plus the usual freight. Sorghum or amber-cane has not fulfilled the hopes of the former “Commissioner of the Department of Agriculture;” and although a certain amount of sugar is produced under the high Government premiums for the cultivation of sorghum and the manufacture of sugar from it, yet the want of successful results, proves that we may consider this portion also of the sugar question as closed.

It only remains, therefore, to throw some light on the production of cane sugar in Louisiana, and the German manufacture may judge whether the sixty millions of the United States can, even in the remotest degree, reckon upon home-produced sugar, or whether they will be driven to import the whole of their consumption. A few years before the outbreak of the civil war, the sugar production of Louisiana increased considerably every year, so

that in 1860 and 1861 it was at its highest point of prosperity ; at that time the Louisiana planters, otherwise called Slavelords, were the richest, most independent, most envied class of the population in America ; but—"Sun ! where art thou now ?" Avenging Nemesis has not only overtaken them, but also manifested her fearful power ! The former lord is now-a-days the slave ; as the slave of old had no hope of liberation, so the Louisiana sugar planter of to-day has no hopes of shaking off his fetters ; he works with a millstone round his neck, he is the slave of the commission merchant. The sugar planter of old may have wielded the slave whip only occasionally, and then very mildly ; the commission merchant now uses the moral scourge with the most pitiless cruelty.

Of the 1100 sugar planters of Louisiana, 50, at the outside, are able to exist, or rather to vegetate, without advances from the commission merchant ; but the remaining 1050 are obliged to obtain advances on the most oppressive conditions in the most humiliating way, and then have to pay interest on these at the rate of 25 to 45 per cent. Apparently they pay less, but only apparently ! They pay 8 per cent. interest, and $2\frac{1}{2}$ per cent. commission, $2\frac{1}{2}$ per cent. buying, and $2\frac{1}{2}$ per cent. selling commission. Then comes brokerage, insurance, coooperation, weighing charges, and all the other etceteras which form the long wind-up of all charges accounts.

As a rule, the contracts which have to be entered into, in order to obtain advances (for which the whole plantation with its effects, movable and fixed, dead and live stock, is mortgaged), are of such a description that the planter not only loses all control over the sugar, but even over the harvest growing in the fields.

If a German sugar manufacturer could only just see, on a rainy November day, the sugar-levée at New Orleans,—the place, or rather the slaughter-house, where the planter has to deliver his sugar, where thousands of hogsheads of sugar and casks of syrup lie in an almost bottomless swamp, to be slaughtered on the new Sugar Exchange, he would swoon away ; and when he had recovered from his faintness, he would feel perfectly convinced that an industry which is afflicted with such a cancer, cannot enter as a competitor into the world's market. Many sugar planters have, therefore, even during the last campaign, worked up all their cane, and so used up the seed for preparing fresh fields. Many fields that were formerly cultivated with sugar cane are, this year, being used for growing rice. In this way the planter becomes more independent of the commission merchant, and the low prices of sugar ; but, at the same time, he is adding to a frightful extent to the already existing malaria. However, he seems to prefer to fall a victim to the malaria fever, rather than to the commission merchant.

If, therefore, there does not very shortly happen some miracle, which will render it possible for the Louisiana sugar planter to continue to exist, we

may consider this formerly flourishing portion of the sugar industry also as done with, and belonging to the past. It thus only remains for the German beetroot sugar manufacturer to take steps to secure for himself the market for these 60 millions of people. Cuba and Porto Rico are similarly situated to Louisiana, and not much better off. Let no one believe that this sketch, which may appear a rough one, is overdrawn; on the contrary, it does not fully depict the actual facts.

The German beetroot sugar manufacturer may, therefore, take hope, especially in seeing how much better situated he is than his companions in misfortune who produce cane sugar."

What the writer says about the Louisiana Sugar Industry, we can accept; but the picture he gives of the hopeless condition of other cane-growing countries, is much overdrawn.—ED. S. C.

ANTIGUA AND THE MUNGOOSE.

We are glad to find that the Legislative Council of Antigua have recently passed an Act for the introduction of the Mongoose into that island, consisting of the four clauses following:—

1. It shall be lawful for the Immigration Commissioners to purchase and cause to be imported into this island the animals commonly called Mongoose at an expenditure not exceeding the sum of two hundred pounds.

2. Such Mongoose when imported shall be distributed among the proprietors or persons in charge of sugar estates in this island in such manner and subject to such regulations as the said Commissioners shall decide, provided that any such proprietor or person in charge shall have made previous application to the said Commissioners to have one or more of such Mongoose allotted to him.

3. It shall be lawful for the said Commissioners to appropriate out of the Immigration Fund under their control a sum not exceeding two hundred pounds to provide for the expense of purchasing, importing, and distributing such Mongoose.

4. This Act shall not come into operation unless and until the Officer administering the Government notifies by proclamation that it is Her Majesty's pleasure not to disallow the same, and thereafter it shall come into operation upon such day as the Officer administering the Government shall notify by the same or any other proclamation.

It is now nearly three years since Mr. Morris published his valuable pamphlet on "The Mongoose on Sugar Estates in the West Indies," which we noticed in the *Sugar Cane* for December, 1882, page 658. Mr. Morris gave some remarkable results following the introduction of the Mongoose into Jamaica; and the surprise is, that with these results before them, such a length of time should have been allowed to elapse before this "exterminator of rats" is made use of in the other islands.—ED. S. C.

THE RUSSIAN SUGAR INDUSTRY.

The Russian Department of Indirect Taxation have recently issued a report for 1883, in which are some interesting statistics, showing the remarkable increase of 100 per cent. during the eleven years 1872-73 to 1882-83, in the production of beet sugar in that country—an increase which is the more remarkable as Russia consumes the sugar she produces. The maxim that high prices are a barrier to increase in competition does not hold good here, for this increase is in spite of heavy and increasing taxes upon the article. The following are the figures—the English equivalents are based upon 62 poods to the ton of 2240lbs. We also give Mr. Licht's estimate for the same periods:—

Year.	No. of Factories.	Sugar produced. Poods.	Tons.	Mr. Licht's Estimate.
1872-73 ..	235 ..	8,479,187	equal to 136,761 ..	150,000
1873-74 ..	249 ..	9,133,389	,, 147,312 ..	150,000
1874-75 ..	249 ..	8,060,853	,, 130,012 ..	130,000
1875-76 ..	254 ..	9,507,015	,, 153,339 ..	245,000
1876-77 ..	260 ..	12,669,594	,, 204,348 ..	250,000
1877-78 ..	245 ..	10,602,918	,, 171,015 ..	220,000
1878-79 ..	240 ..	11,101,063	,, 179,049 ..	215,000
1879-80 ..	239 ..	12,544,628	,, 202,333 ..	275,000
1880-81 ..	236 ..	12,399,897	,, 199,998 ..	250,000
1881-82 ..	235 ..	15,936,714	,, 257,044 ..	308,799
1882-83 ..	237 ..	17,537,890	,, 282,869 ..	284,491

The figures are made up from the manufacturers' returns, and only come down to 1882-83. It is stated that the total output for the past three years will average 15,600,000 poods, or 251,613 tons. Since 1881 the duties upon sugar have been twice raised, without however any unfavourable effect upon the production. In 1883-84, an additional area of 41,706 dessiatines (or about 150,000 English acres) was sown with beetroots, but the result was not very satisfactory, though the year's production was equal to that of 1882-83. The twenty refineries in Russia, principally at Moscow, Kiew, Kharkov, and St. Petersburg, turned out in 1883-84, 147,592 tons.

Within the past three years, sorghum has been grown at Pultawa, Kiew, and in one or two other provinces—and by way of encouraging sorghum growing, the Government have remitted the tax upon it.

AN OLD BOOK ON SUGAR MAKING IN BARBADOS, 1657.

The following is the exact title of the oldest book on the Art of Making Sugar in the West Indies:—

“ A True and Exact History of the Island of Barbados. Illustrated with a Mapp of the Island, as also the Principall Trees and Plants there, set forth in their due Proportions and Shapes, drawne out by their severall and respective Scales. Together with the Ingenio that makes the Sugar, with the Plots of the severall Houses, Roomes, and other places, that are used in the whole process of Sugar making: viz., the Grinding-room, the Boyling-room, the Filling-room, the Curing-house, Still-house, and Furnaces; All cut in Copper. By Richard Ligon, Gent.

London, Printed for Humphrey Moseley, at the Prince's Armes, in St. Paul's Church-yard, 1657. (Folio 122 pages.)

It says something for the value of the work, that a second edition—not a common thing in those days—was called for in 1673.

The author's introduction is very quaint. In it he says:—

“ Having been censur'd by some for my weaknesse and indiscretion, that having never made prooffe of the Sea's operation, and the severall faces that watry Element puts on, and the changes and chances that happen there, from Smooth to Rough, from Rough to Raging Seas, from High going Billowes (which are killing to some Constitutions), should in the last Scene of my life, undertake to run so long a Risco from *England* to the *Barbadoes*; And truly I should without their help conclude myselfe guilty of that Censure, had I not the refuge of an old proverb to fly to, which is (Need makes the old wife trot :) for having lost (by a Barbarous Riot) all that I had gotten by the painfull travells and cares of my youth; by which meanes I was stript and rifled of all I had, left destitute of a subsistence, and brought to such an Exigent, as I must famish or fly; and looking about for friends, who are the best supporters in so stragging a condition, found none or very few whom griefs and afflictions had not deprest, or worne out, Banishment absented, or Death devour'd; so that instead of these neere and Native comforters, I found myselfe a stranger in my owne Country, and therefore resolv'd to lay hold on the first opportunity that might convoy me to any other part of the World, how far distant soever, rather then abide here. I continued not many weekes in this expectation, when a friend, as willing to shift his ground as I, gave me an Overture which I accepted, and so upon the sixteenth day of *June*, 1647, we embark'd in the *Downes*, on the good Ship called the *Achilles*, a vessell of 350 tunnes, the *Mr. Thomas Crowder*, of *London*; and no sooner were we all aboard, but we presently weighed Anchor, and put to Sea; in so cold weather as at that time of the yeere, I have not felt the like; and continued so till wee came to *Falmouth Harbour*; where wee put in, and rested for a night; but in our passage thither, were very uncertaine upon what Coast wee were, by reason of the unsteadinesse of the windes, and cloudinesse

of the weather ; so that I perceived more troubles and doubts in the Seamen in that short passage than in all the voyage after."

The vessel proceeds to the Cape Verd Islands, and then bore away to Barbados, which place they reached in twenty-two days. Here they found half the people dead of the yellow fever, and the other half ready to follow them from famine.

Ligon remained out in Barbados some three years, acting as deputy manager to the owner of a plantation of some 500 acres. This was in 1647, or six years after the first Sugar Canes, which were procured from Pernambuco, were planted in Barbados. Yet in these six years several sugar mills had been set up, and the "Industry" had become so prosperous, that in 1650, when our author returned to England—"a plantation of 500 acres, which before they planted canes, could have been bought for £400, was worth £14,000."

It is related of Colonel James Drax, who commenced with £300, growing rapidly so rich, that

"He would not return to settle in England, for the remainder of his life, till he should be able to purchase a land estate of ten thousand pounds per annum, which he hoped in a few years to accomplish."

Colonel Thompson also told the author—

"That he had taken a resolution to himself not to set his face for England until he had made his voyage and employment there worth one hundred thousand pounds sterling."

Our author gives the expenditure and receipt account, for one year, of an estate of 500 acres, showing a net profit of more than £7500. This is the bright side of the picture. It is as follows :—

AN ACCOUNT OF EXPENCES ISSUING OUT YEARLY, FOR CLOTHING FOR THE CHRISTIAN SERVANTS, BOTH MEN AND WOMEN, WITH THE WAGES OF THE PRINCIPALL OVERSEERS, WHICH SHALL BE £50 STERLING, OR THE VALUE IN SUCH GOODS AS GROW UPON THE PLANTATION.

To the five subordinate Overseers,
for each mans cloathing.

	£	s.	d.
Six shirts, at 4s. a piece	1	04	0
Six pair of Drawers, at 2s.	0	12	0
Twelve pair of Shoes, at 3s.	1	16	0
Six pair of Linnen or Irish stockings, at 20d.	0	10	0
Three <i>Monmouth</i> Caps, at 4s.	0	12	0
Two doublets of Canvas, and six Holland bands	0	15	0
Sum totall for each man..	5	9	0
Sum totall for the five overseers	27	5	0

To the fourteen common servants.

	£	s.	d.
Six shirts to each man ..	1	04	0
Six pair of drawers to each man	0	12	0
Twelve pair of shoes, at 3s	1	16	0
Three <i>Monmouth</i> Caps, at 4s	0	12	0
Sum totall to each man..	4	04	0
Sum totall, of the fourteen servants by the year	58	16	0

Now for the ten women servants, we will dispose of them thus:
Four to attend in the house, and those to be allowed, as followeth in the first Columne, viz.

The four that attended in the house to each of them.

	£	s.	d.
Six smocks, at 4s. a piece	1	04	0
Three petticoats, at 6s ..	0	18	0
Three wastecoats, at 3s ..	0	09	0
Six coifes or caps, at 18d. a piece	0	09	0
Twelve pair of shoes at 3s	1	16	0
Sum is	4	16	0
Sum totall of the four women that attend in the house	19	4	0

The other six that weed and do the common work abroad yearly.

	£	s.	d.
Four smocks, at 4s. a piece	0	16	0
Three petticoats, at 5s. a piece	0	15	0
Four coifs, at 12d. a piece	0	04	0
Twelve pair of shoes, at 3s	1	16	0
Sum is	3	11	0
Sum totall of the six common women servants ..	21	06	0

Thirty Rug Gownes for these thirty servants, to cast about them when they come home hot and wearied, from their work, and to sleep in a nights, in their Hamocks, at 25s. a Gown or mantle .. 37 10 0

Now for the Negres, which we will account to be a hundred of both sexes, we will divide them equally; The fifty men shall be allowed yearly but three pair of Canvas drawers a piece, which at 2s. a pair, is 6s.

The women shall be allowed but two petticoats a piece yearly, at 4s. piece, which is 8s. yearly.

So the yearly charge of the fifty men Negres, is....	15	00	0
And of the women	20	00	0
Sum is	35	00	0

Now to sum up all, and draw to a conclusion, we will account, that for the repairing dilapidations, and decays in the houseing, and all Utensills belonging thereto.

	£	s.	d.
We will allow yearly to issue out of the profits, that arise upon the plantation	500	00	00
As also for the moderate decayes of our Negres, Horses, and Cattle, notwithstanding all our Recruits by breeding all those kinds	500	00	00
For forraign provisions of victualls for our servants and some of our slaves, we will allow yearly	100	00	00
For wages to our principall Overseer yearly	50	00	00
By the abstract of the charge of Cloathing the five subordinate Overseers yearly	27	05	00
By the Abstract of Cloathing, the remaining 14 men-servants yearly	58	16	00
By the Abstract of Cloathing four women-servants that attend in the house	19	04	00
By the Abstract of the remaining six women-servants, that do the common work abroad in the fields	21	06	00

	£	s.	d.
The charge of thirty Rug Gowns for these thirty servants....	37	10	00
By the abstract of the cloathing of fifty men-Negres	15	00	00
By the abstract for the cloathing of fifty women-Negres	20	00	00
Sum totall of the expences is	1349	01	00
Sum totall of the yearly profits of the Plantation	8866	00	00
So the clear profit of this plantation of 500 acres of land amounts to yearly	7516	19	00

A large Revenue for so small a sum as £14,000 to purchase, where the Seller does not receive two years value by £1,000 and upwards; and yet gives daies of payment.

The reason for this, we give in Ligon's own words; and this is the dark side:—

I have been believed in all, or the most part, of my former descriptions and computations, concerning this Iland, and the waies to attain the profits that are there to be gathered; but when I come to this point, no man gives me credit, the business seeming impossible, that any understanding man, that is owner of a Plantation of this value, should sell it for so inconsiderable a sum; and I do not at all blame the incredulity of these persons; for, if experience had not taught me the contrary, I should undoubtedly be of their perswasion. But lest I should, by an over-weening opinion, hope, that my experience (which is only to myselfe) should mislead any man besides his reason, which every knowing man ought to be guided and governed by, I will without straying or forcing a reason, deliver a plain and naked truth, in as plain language, as is fitting such a subject, which I doubt not but will perswade much in the businesse.

'Tis a known truth there, that no man has attained to such a fortune as this, upon a small beginning, that has not met with many rubs and obstacles in his way, and sometimes fallings back, let his pains and industry be what it will: I call those fallings back, when either by fire, which often happens there; or death of Cattle, which is as frequent as the other: or by losses at Sea, which sometimes will happen, of which I can bring lively instances; If either of these misfortunes fall, it stands in an equall ballance, whether ever that man recover, upon whom these misfortunes fall: But, if two of these happen together, or one in the neck of another, there is great odds to be laid, that he never shall be able to redeem himselfe, from an inevitable ruine; For, if fire happen, his flock is consumed, and sometimes his house; if his Cattle die, the work stands still, and with either of these his credit falls; so as if he be not well friended, he never can entertain a hope to rise again.

These toyls of body and minde, and these misfortunes together, will depress and wear out the best spirits in the world, and will cause them to think, what a happy thing it is, to spend the remainder of their lives in rest and quiet in their own Countries. And I do believe, there are few of them, whose mindes are not over-ballanc'd with avarice and lucre, that would not be glad to sell good penni-worths, to settle themselves quietly in *England*. Besides the casualties which I have named, there is yet one of

neerer Concern than all the rest, and that is, their own healths, than which, nothing is more to be valued; for sicknesses are there more grievous, and mortality greater by far, than in *England*, and these diseases many times contagious: And if a rich man, either by his own ill diet or distemper, or by infection, fall into such a sickness, he will finde there a plentiful want of such remedies, as are to be found in *England*. Other reasons, and strong ones, they have, that induce them to hanker after their own Country, and those are, to enjoy the company of their old friends, and to raise up families to themselves, with a sum which they have acquired by their toyle and industry, and often hazards of their lives, whose beginnings were slight and inconsiderable; and what can be a greater comfort, both to themselves, and their friends, then such an enjoyment. But I speak not this to discourage any man, that has a mind to improve his Estate, by adventuring upon such a Purchase; for, though the Planter, by long and tedious pain and industry, have worn out his life, in the acquist of his fortune; yet, the Buyer, by his purchase, is so well and happily seated, as he need endure no such hardships, but may go on in the managing his business, with much ease, and some pleasure; and in a dosen years, return back with a very plentiful fortune, and may carry with him from *England*, better remedies for his health, then they. who for a long time had neither means to provide, nor money to purchase it; for, though some Simples grow there, that are more proper for the bodies of the Natives, than any we can bring from forraigne parts, and no doubt would be so for our bodies too, if wee knew the true use of them; yet wanting that knowledge, we are faine to make use of our own.

The book contains a very rude map of the Island, which is described as "A Typographicall Description and Admeasurement of the YLAND OF BARBADOES in the WEST INDYAES, with the M^{RS}. Names of the small plantacions." The South and West Coasts are full of what would seem to be the names of the proprietors of the lands there. A little to the north of Carlile Bay is marked "The Tenn Thousande Acres of land which belongeth to the Merchants of London." The rest of the map is filled up with illustrations indicating the sort of life led there. Men on horseback persuing and shooting negroes, hunting wild boars, and there are some animals drawn which look more like camels than anything else. Besides giving numerous drawings of the plants which abound in the Island, there are several plans of the machinery then used in the manufacture of sugar. Altogether the book is as interesting as it is quaint and curious. It is very rare; we heard of a copy being sold in London recently for as much as £5.

A BIBLIOGRAPHY OF SUGAR AND OF OUR SUGAR COLONIES.

IN THREE PARTS, CHRONOLOGICALLY ARRANGED.

PART II.—FROM 1801 TO 1850.

(Continued from page 432, August, 1884, Vol. XVI.)

No.

202. The Slavery of the British West India Colonies delineated, as it exists both in Law and Practice, and compared with the Slavery of other Countries, antient and modern. By James Stephen, Esq. 2 vols., 8vo. London, 1824-1830.

NOTE.—Contents: "The High Probability that the amount of Forced Labour on *Sugar Plantations* is oppressively and destructively excessive." "The Actual ordinary Details, and general Amount in Point of Time of Forced Labour on *Sugar Plantations*, particularly stated and proved." "Comparison of the amount of Slave Labour on *Sugar Plantations* with that of Agricultural Labourers in England." The Means by which Labour is enforced on *Sugar Plantations* greatly aggravates its severity, &c., &c.

203. Extract of a Letter addressed to W. W. Whitmore, Esq. In Reply to the Erroneous Statements of the late Joseph Marryat, Esq., on the subject of Slavery in the East Indies, by the Author of a Pamphlet entitled "East and West India Sugar." 4 pages, folio. No date [1825?]

204. On Sophistical Arguments against a Conscientious Disuse of Sugar produced by Slave Labour.

4 pages, 12mo. Dublin. No date.

205. East India Sugar Basins. East India Sugar not made by Slaves. B. Henderson, Rye Lane, Peckham.

1 page, 16mo. Camberwell. No date.

NOTE.—Only a handbill.

206. A Short Review of the Slave Trade and Slavery, with Considerations on the Benefit which would arise from Cultivating Tropical Productions by Free Labour. 8vo. 1827.

207. Chronological History of the West Indies from 1492 to 1816. By Captain Thomas Southey, R.N. 3 vols. 8vo. 1827.

NOTE.—An interesting work—it might suitably be called the Paragraph History of the West Indies—it abounds with scraps of information about Sugar.

208. A Practical View of the Present State of Slavery in the West Indies; or, An Examination of Mr. Stephen's "Slavery of the British West India Colonies," containing more particularly An Account of the Actual Condition of the Negroes in Jamaica, etc. By Alexander Barclay.

Second edition, 8vo. London, 1827.

NOTE.—Contains: on the "Commercial Character of Sugar Estates, and how it Affects the Slaves," etc., etc.

209. A Lecture on the Geography of Plants. By John Barton. (Map.) 12mo, London, 1827.

Article, *Sugar Cane*; pages 4, 44, 78, 91.

210. Laws of the British Colonies in the West Indies and other parts of America. By Jno. Henry Howard.

2 vols. 8vo. London, 1827.

211. Encyclopædia Londinensis; or Universal Dictionary of Arts, Sciences, and Literature, &c. By John Wilkes, and others. Vol. XXIII. (Article, "Sugar.") 4to. 1828.

212. The Oxford Encyclopædia, or Dictionary of Arts, Sciences, and Literature, &c. By Rev. W. Harris, J. A. Stewart, A. M. C. Butler, Esq., and the Rev. J. H. Hinton, A.M. Vol. VI. (Article, "Sugar," 4 pages, double columns.)

Large 4to. Oxford, 1828.

213. Colonial Commercial, comprising an Inquiry into the Duties . . . on Sugars. By Alexander Macdonnell, Esq. (302pp.)

8vo. London. 1828.

214. The Elements of Experimental Chemistry. By Wm. Henry, M.D. The Eleventh Edition, comprehending all the recent discoveries; and illustrated with ten plates by Lowry, and several engravings on wood.

2 vols., 8vo., London, Baldwin and Cradock, 1829.

NOTE.—Contains: "Action of Chlorine on Sugar, Animal Sugar, Sugar Candy; Component parts of Sugar, Equivalent of Sugar; Gelatine convertible into Sugar; Sugar of Lead; Sugar of Milk; Preparation of Sugar from Beet; Cane, Gelatine, Grapes; Properties of Cane Sugar; Starch convertible into Sugar."

215. Conversations on Common Things; or a Guide to Knowledge. (Sugar, &c.) 18mo. York, 1829.

216. Bazy (S.) De la fabrication des Sucres en France et aux Colonies. (87pp.) 8vo. Paris, 1829.

217. Nature and Properties of the Sugar Cane, with Practical Direc-

- tions for the Improvement of its Culture and the Manufacture of its Products. By Geo. Richardson Porter. With illustrations. (vii. 390pp.) 8vo. London, 1830.
2nd edition. (xiv. 240pp.) 8vo. London, 1843.
Reprinted in America, 8vo. Philadelphia, 1831.
218. A Short History of the Poor Black Slaves who are employed in cultivating *Sugar*, Cotton, Coffee. &c. Intended to make little children in England pity them, and use their endeavours to relieve them from bondage. [Anon. by Wm Naish.]
12mo. London, [about 1830.]
219. Reasons for using East India Sugar. (5 editions.) [By Wm. Naish.]
12mo. London, [about 1830.]
220. A Brief Description of the Toil and Sufferings of Slaves in the British Sugar Colonies, at the present time, by several Eye Witnesses. [By Wm. Naish.] 12mo. No date.
221. The Advantages of Free Labour over the Labour of Slaves, *elucidated in the cultivation of Pimento, Ginger, and Sugar.* [By Wm. Naish.] (3 editions.) 12mo. No date.
222. Review of Facts and Observations made by Naturalists, Botanists, Historians, and Travellers, on the Properties and Productions of the Sugar Maple Tree, the process of Extracting the Sap, converting it into Sugar, &c. By E. Jones.
(Privately printed.) (72pp.) 8vo. 1832.
223. Report of the Select Committee of the House of Commons, on the State of the West Indies.
Ordered to be printed 13th April, 1832.
224. Review of a Report of a Select Committee of the House of Commons on the State of the West India Colonies. Ordered to be printed 13th April, 1832. London, Sold by J. and A. Arch, and Hatchard and Son.
225. A Treatise on Chemistry. (Sugar, p. 294.) By Michael Donovan, M.R.I.A. See Lardner's "Cabinet Cyclopaedia," vol. 106. 8vo. 1832.
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3rd edition enlarged. 8vo. 1833.

227. Three Months in Jamaica in 1832, comprising a Residence of some weeks on a *Sugar Plantation*. By Henry Whiteley. 8vo. 1833.
228. Wages or the Whip. An Essay on the comparative cost and productiveness of Free and Slave Labour. By Josiah Conder. 8vo. 1833.
229. A Vindication of a Loan of £15,000,000 to the West India Planters. By James Cropper. (16pp.) 8vo. London, 1833.
- NOTE.—On "Sugar," "Sugar Refining," &c.
230. An Account of the present State of the Island of Puerto Rico. By Colonel George D. Flintner. 8vo. London, 1834.
231. The British Cyclopædia of the Arts and Sciences; including Treaties, &c. By Charles F. Partington. (Article, "Sugar," 4pp.) Complete in 2 vols. 8vo. London, Orr and Smith, 1835.
232. Fabricant de Sucre et de Raffineur. Par M. de Mornay. (Plates.) 12mo. 1837.
233. On Saccharine Substances. By A. Aiken. (48pp.) 8vo. London, 1837.
234. The West Indies; the Natural and Physical History of the Windward and Leeward Colonies; with some account of the moral, social, and political condition of their inhabitants immediately before and after the abolition of Negro Slavery. By Sir Andrew Halliway, M.D. 12mo. London, 1837.
235. Sacred Philosophy of the Seasons. *Autumn*. (Article on "Sugar.") By Henry Duncan, of Ruthwell? 3rd edition. 8vo. Edinburgh, 1838.
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Calcutta: G. Wollaston, Printer and Publisher, No. 8, Aspland Row. 8vo. 1838.

NOTE.—The vol. for 1838 contains (see page 719) Recent Patent Inventions; Improvements in the Manufacture of Sugars, by George Gwynne and Janus Young (6 pages double columns, with a plate xxiv. and description of the drawing); also Article II. Sugar Cane from Singapore; Dr. Montgomerie; Remarks on the Sugar Mill, by P. Edgeworth, Esq.; Otaheite Sugar Cane in the district of Azim-gush; Otaheite Sugar Cane in the Dhoon, by G. H. Smith, Esq.

237. Letters from the West Indies relating especially to the Danish Island St. Croix, and the British Islands Antigua, Barbados, and Jamaica. By Sylvester Hovey.
pp. iv., 212, 8vo. New York, 1838.
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239. Statistics of the Colonies of the British Empire in the West Indies, South America, North America, Asia, Austral-Asia, Africa and Europe.
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8vo. London, Norwich printed, 1840.
- NOTE.—Contains some references to Sugar Estates, &c.
242. A description of British Guiana, Geographical and Statistical; exhibiting its resources and capabilities together with the present and future condition and prospects of the Colony.
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253. Monopoly the Promoter of Slavery; being the Substance of a Speech on the Sugar Question, delivered at the Free Trade Hall, Manchester, 19th October, 1843. (7pp.) 12mo. Manchester, 1843.
254. The Assertion of the Bishop of Norwich, that there is Alcohol in Sugar, &c., examined and refuted. By A. C. Isaacs. (16pp.) 8vo. Shrewsbury, 1843.
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- NOTE.—Articles, "*Sucre*," "*Sucre Candi*," "*Sucre d'orge*," "*Sucre de hommes*," "*Sucretors*," &c., &c.

To be continued.

THE PROPOSED SPANISH-AMERICAN RECIPROCITY TREATY.

The following is a summary of the report of the committee of the New York Chamber of Commerce, giving their reasons why the treaty should not be proceeded with :—

1. It is not a reciprocity treaty. It should be termed a treaty for the relief of bankrupt Cuban estates, and to make the islands once more a source of revenue to Spain, at the expense of the United States.

2. It proposes to relinquish revenues estimated at thirty millions annually (£6,000,000), as against three or four millions (£600,000 to £840,000), (which would only accrue to the benefit of Cuban consumers), and we are asked to throw open a market of fifty-five millions of people, possessing large purchasing powers, in exchange for one or two millions, possessing large producing, but small purchasing power.

3. It would not benefit our manufacturers to any great extent, for the population opened to us is too small, and their purchasing power too limited. If it be sought to benefit our shipping, a monopoly of this trade can be secured by remitting one-tenth of the duties on sugar carried in American bottoms, instead of remitting all of it and placing Spanish shipping on an equality, as is proposed by this most curious piece of diplomacy.

4. It would destroy our American sugar-producing interests, representing an investment estimated at upwards of one hundred millions of dollars.

5. It would seriously derange our important American tobacco and cigar interests.

6. It would not cheapen either of these products to American consumers, for Cuban producers would ask as much for their sugar as those of other nations not thus favoured, and the benefits would chiefly inure to Spain and to Spanish-American planters and merchants.

7. It would throw thousands of American labourers out of employment, at a time when least of all we can afford to add to the army of the unemployed, or to put American citizens and voters in competition with tropical coolie labourers, whose wants and wages bear no proportion to our own.

8. Only with an increased supply of coolie labour could the production of these islands be largely increased, and thus it would give a renewed impetus to the system of coolie contract labour in which the coolie is often treated worse than the slave, for the same reason that a hired animal often fares worse than one which is owned.

9. It would strengthen and renew the fast-weakening influence of Spain in American waters, and doubly injure American citizens—first, by throwing large numbers out of employment; and, second, by taxing the rest to make up for the revenues presented to Spain.

10. It would unjustly discriminate against the productions of other friendly nations which take of our products far more than Cabul and Porto Rico possibly can, and might involve us in complications with these nations.

11. The revenue of a single year proposed to be relinquished by us would build a creditable navy, or fortify our harbours, or build a postal telegraph, or enlarge our canals, thus furnishing American labourers with employment; OR WE MIGHT RELIEVE OUR CITIZENS FROM TAXATION TO THAT EXTENT; OR, for one-tenth of this sum, we could establish American steam-lines to all South and Central American ports, which would do more to build up our commerce than ten such one-sided reciprocity treaties.

12. IT WOULD ENORMOUSLY ENRICH THE FEW PERSONS WHO ARE PUSHING THIS TREATY, JUST AS THE SANDWICH ISLANDS TREATY HAS DONE, BUT THIS WOULD BE AT THE EXPENSE OF THE AMERICAN PEOPLE, AND THE PUBLIC INTEREST SHOULD NOT BE SACRIFICED FOR PRIVATE GAIN.

MONTHLY LIST OF PATENTS.

Communicated by Messrs. W. P. THOMPSON & Co., C.E., M.S.C.I.,
Fel.Inst. P.A., Patent Agent, 6, Lord Street, Liverpool; and
323, High Holborn, London, W.C.

ENGLISH.

APPLICATIONS.

2329. JOHN LAIDLAW, Glasgow. *Improvements in the manufacture of sugar and in apparatus therefor.* 20th February, 1885.

2345. LORENTY A. GROTH, London. (A communication from abroad by Carl Piefke, Germany.) *Improvements in apparatus and in material employed therein for filtering purposes.* 20th February, 1885.

2553. HENRY J. CHAPIN, London. *Improvements in apparatus or devices for the treatment of sugar cane.* 25th February, 1885.

2642. JOHN H. JOHNSON, London. (A communication from abroad by F. Quarez and R. Quarez, France.) *Improvements in filter presses.* 26th February, 1885.

2724. CHARLES D. ABEL, London. (A communication from abroad by La Société Nouvelle de Raffineries de Sucre de St. Louis, France.) *Process for the purification and decolouration of saccharine liquors, juices, or syrups.* 28th February, 1885.

2738. GEORGE BUCHANAN, London. *Improvements in machinery or apparatus for treating sugar cane.* 28th February, 1885.

3055. RICHARD J. FRISWELL and A. MYALL, Charing Cross. *Improvements in filter presses.* 9th March, 1885.

ABRIDGMENTS.

6968. ARTHUR W. L. REDDIE, London. (Communicated to him from abroad by Monsieur Mariano Agrela, Paris, Engineer.) *Improvements in furnaces for burning green sugar cane and similar moist substances.* 29th April, 1884. This consists in a combined furnace, part of which is used for bagasse and part for coals. The furnace is so arranged that when very wet bagasse is used the auxiliary coal furnace can be made to keep up the heat and assist in drying the bagasse.

311799. HILARIO YSABA Y. LAZARTE and EUGENE PROSPERO LARRE, Santa Clara, Cuba. *Heater and evaporator for syrup and other liquids.* 3rd February, 1885. This consists in an evaporating or boiling apparatus, having a pan to contain the material to be evaporated, a jacket below the same, a steam generator or boiler, and a direct connection from the upper part of the boiler to the steam jacket, so that the steam passes directly into the steam jacket, and water of condensation runs back into the boiler. To

aid the evaporative power of the pan U shaped steam tubes stand up from the dome-shaped bottom of the pan into the boiling space.

311878. GEORGE DINKELL, Jersey City, New Jersey, Assignor to F. O. Matthiessen and Wiecher's Sugar Refining Company, of same place. *Magma pump*. 10th February, 1885. The inventor employs a cylinder, preferably horizontal, arranged beneath the magma tank, and having eduction ports at both ends; and having midway in its upper side a comparatively large induction port connected with the magma tank. Within the cylinder is a close-fitting suitably long plunger affixed to the end of a piston rod which extends through the head of the cylinder, and is connected with mechanism, by which it is reciprocated. The plunger may be equal in length to the diameter of the induction port. It is preferably provided upon its upper side with a longitudinally sliding shield. This shield is longer than the plunger, and is therefore brought into collision alternately with the valves or with the opposite ends of the cylinder, and held stationary during the latter part of each stroke of the plunger. At the commencement of each stroke the shield projects over in front of the advancing plunger, and hence covers the induction port before the plunger reaches the middle of the cylinder under the induction port. The eduction ports are each provided with an outwardly yielding self-closing valve, and are connected with the pipe or pipes through which the magma, forced alternately from the opposite ends of the pump-cylinder by the movements of the plunger, is conducted to any prescribed point.

GERMAN.

ABRIDGMENTS.

27362. GUSTAV VIBRANS, Uefingen. *Juice filter for sugar manufactories*. 21st June, 1883. The filter consists of a funnel, covered with a woven material and standing on its point. This cone is made of perforated sheet iron or the like, and is fixed in the bottom of the vessel by aid of a cone and a screw-worm, in such a manner as to be easily unfastened and yet fitting well in the bottom. The sugar juice penetrates the exterior surface of the filter to the interior, and flows through the point of the cone. The sludge which settles on the surface of the woven material sinks by reason of the inclined position of the same to the floor, so that the surface is kept tolerably clean.

27363. GUSTAV PROBER, Gutschdorf, near Gr. Rosen. *Juice holder for quick evaporating apparatuses*. 2nd September, 1883. The receiver or juice holder is fixed above under the cover of the box-shaped apparatus, and consists of a cylindrical mould segment, two sieve-like perforated surfaces for catching the juice, and a discharge pipe, which conducts the syrup that has collected back to the liquid in the apparatus.

27529. R. FOLSCHÉ, Halle-on-S. *A beetroot rinser for diffusion batteries.* 19th October, 1883. A drain pipe proceeding from the cutting machine is laid over the diffusion battery, which is arranged in two rows, by means of a shunt arrangement this drain pipe is made to deliver to both rows of the diffusion battery. The drains are either laid sideways and communicate by special supports and stop slides with the separate diffusers, or they are placed in the middle over the upper manholes of the diffusers, and are furnished with spouts capable of being closed, and which are fixed as required over each diffuser. The cuttings from the shredding machine are rinsed with the smallest possible quantity of raw juice from a reservoir fixed above, the stop-slides being closed up to that leading towards the diffuser to be filled.

27541. FR. ULRICH, Leopoldshall. Improvements on Patent 24963 for a distributing apparatus for root-cutting machines. The construction of the machine, as given in the principal patent, is altered in such a manner that the shaft setting the distributing apparatus in motion is entirely separate from the main shaft for setting in motion the cutting blades, as well as from the movement of the distributing apparatus outside the hopper and the charging space in connection with it. The distributing shovels are made of an angular form, and bent into a peculiar shape, whereby the roots are delivered lengthwise, so that longer cuttings are produced.

27364. OTTO LICHT, Sudenburg-Magdeburg. *Filtering Apparatus.* 24th October, 1883. The filtered juice flows away from the beetroot apparatus, which is charged with granulous material, for the purpose of filtering through a long syphon pipe fixed outside the same. At the commencement of filtration this pipe is not brought into use, but is used solely as an overflow pipe, being connected at its upper part with the outside air by means of pipes, but during the gradual stopping up of the pores of the filter and consequent hindrance to the progress of filtration, communication with the air is closed by means of a cock, and the syphon pipe is brought into play. While the air is thus gradually forced further and further through the air pipe cocks in the syphon and the column of liquid inside it gradually lengthened, the power of absorption which the air exercises upon the juice in the filter can be increased at will, so that in spite of the increasing hindrance to filtration in the filter the speed with which the juice is discharged remains the same.

27550. LEBAUDY BROTHERS, Paris. *Extracting sugar from molasses by the aid of strontia.* 8th October, 1882. The molasses is mixed with soda or potash lye (23 per cent. to 36 per cent. NaHO , or 32 per cent. to 50 per cent. HKO of the percentage of sugar in the molasses), the solution of saccharate thus obtained is boiled for some minutes in order to completely destroy the inverted sugar (the glucose), and is decomposed with a boiling solution of

a strontium salt containing about 23 to 35 parts of strontium oxide per 100 parts of sugar in the molasses. The granular precipitate of strontium saccharate thus obtained is filtered off through filter presses, washed out with a very weak strontia solution, and decomposed in the usual manner by carbonic acid or sulphurous acid. From the residual strontium carbonate or sulphite there is obtained by decomposition, by aid of an acid in a gas-holder, strontium salt for a succeeding operation, as well as the carbonic or sulphurous acid employed, and which may be used again for decomposing a fresh quantity of strontium saccharate.

27601. GUSTAV REMY, Beuchlitz, near Halle-on-Saale. *Cutting press with endless channel and chain.* 4th January, 1884. The lixiviated root cuttings are pressed between an endless travelling channel, which is in continuous movement, over polygonal drums, and an endless chain, provided with ribs or carriers, travelling also over rollers in the same direction. The channel is composed of separate boxes, open before and behind, the bottoms of which are perforated, and which boxes are hinged together. Teeth or ribs, which in these boxes stand in place of the front and back sides, serve for carrying forward the pressed cuttings. The under side of the boxes is furnished with a number of teeth, so that it forms an endless chain of teeth, and is kept in continual movement by means of a circular toothed wheel. The row of boxes which compose the channel, together with the chain, are supported by a number of pressing rollers of different sizes. These rollers receive the counter-pressure of the material.

27614. J. PAUL LIEBE, Dresden. *Apparatus and process for producing in the vacuum pan a continuous automatic movement of the liquid to be evaporated.* 19th October, 1883. The bottom of the vacuum apparatus is connected with a pulverizing contrivance fixed in the upper part of the same by a cylinder placed outside the apparatus, by means of which, and during the action of the exhaust pump in the apparatus, a pulsating, but uninterrupted flow of juice towards the pulverizer, and thereby a constant circulation of the former is obtained. The cylinder is joined to the vacuum apparatus by means of an elbow pipe, one end of which is connected with an outer clack valve; it is furnished in its interior with a lifting pipe curved at its lower end, an air cock fixed higher up, and lower down a cock for charging the vacuum apparatus before the machine is set in motion.

Patentees of Inventions connected with the production, manufacture, and refining of sugar will find *The Sugar Cane* the best medium for their advertisements.

The Sugar Cane has a wide circulation among planters in all sugar producing countries, as well as among refiners, merchants, commission agents, and brokers, interested in the trade, at home and abroad.

IMPORTS OF FOREIGN REFINED SUGAR.

The British Sugar Refiners' Committee furnish us with the following figures, giving the imports of foreign refined sugar for the month of February compared with the corresponding month of last year, and the average monthly imports for the past year compared with those of 1882 and 1883, distinguishing the quantities of "Lumps and Leaves" from "other sorts," and giving the separate imports from each country:—

	"LUMPS AND LEAVES."						"OTHER SORTS," Including Crushed Loaf, Granulated, Crystallized, &c.						TOTAL.					
	Monthly Average.			Feb.,			Monthly Average.			Feb.,			Monthly Average.			Feb.,		
	1884.			1885.			1884.			1885.			1884.			1885.		
	Tons.			Tons.			Tons.			Tons.			Tons.			Tons.		
	1882.	1883.	1884.	1882.	1883.	1884.	1882.	1883.	1884.	1882.	1883.	1884.	1882.	1883.	1884.	1882.	1883.	1884.
France	3638	3538	2737	2694	3567	3567	1953	2477	1621	824	2290	4358	5591	6015	4358	3518	5857	5857
Holland	1763	2352	3580	4042	2821	2821	1522	1853	1948	1530	1520	5523	3285	4205	5523	5572	4341	4341
Germany & Austria	513	588	552	669	487	487	948	1854	2380	3557	1941	2932	1461	2442	2932	4226	2428	2428
Belgium	657	319	183	192	237	237	67	124	151	113	252	334	724	443	334	305	489	489
United States	94	226	962	285	135	135	101	294	3386	2881	162	4348	195	520	4348	3166	297	297
Other Countries ..	..	..	..	8	..	..	269	61	121	2	38	121	269	61	121	10	38	38
Total	6665	7023	8014	7890	7247	7247	4860	6663	9807	8907	6203	17621	11525	13686	17621	16797	13450	13450

SUGAR STATISTICS—GREAT BRITAIN.

TO MARCH 21ST, 1885 AND 1884. IN THOUSANDS OF TONS, TO
THE NEAREST THOUSAND.

	STOCKS.		DELIVERIES.		IMPORTS.	
	1885.	1884.	1885.	1884.	1885.	1884.
London	91	.. 96	79	.. 86	80	.. 96
Liverpool ..	113	.. 88	62	.. 65	63	.. 76
Bristol	4	.. 6	12	.. 12	12	.. 11
Clyde	76	.. 72	55	.. 54	81	.. 66
	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>
Total ..	284	262	208	217	236	249
	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>
	Increase..	22	Decrease....	9	Decrease ..	13
	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>

SUGAR STATISTICS—UNITED STATES.

(From Messrs. Willett & Hamlin's Circular, New York.)

FOR THE FOUR PRINCIPAL PORTS. IN THOUSANDS OF TONS, TO THE
NEAREST THOUSAND. FOR FEBRUARY, 1885 AND 1884.

	STOCKS.		DELIVERIES.		IMPORTS.	
	March 1st,		For Feb.,		For Feb.,	
	1885.	1884.	1885.	1884.	1885.	1884.
New York	53	.. 46	55	.. 56	57	.. 64
Boston	18	.. 13	10	.. 9	10	.. 13
Philadelphia....	3	.. 2	6	.. 10	6	.. 10
Baltimore . . . . .	..	.. ..	..	.. ..	..	.. ..
	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>
Total.....	74	61	71	75	73	87
	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>
	Increase..	13	Decrease..	4	Decrease..	14
	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>
Total for the Year ..	..	..	159	155	144	153

In the case of Baltimore, where nothing is put down, it means that the Stock, Imports, and Deliveries, do not exceed 500 tons in each case.

STOCKS OF SUGAR IN THE CHIEF MARKETS OF EUROPE ON THE
31ST JANUARY, FOR THREE YEARS, IN THOUSANDS
OF TONS, TO THE NEAREST THOUSAND.

Great Britain.	France.	Holland	Germany (Zollverein)	Four other entrepôts.	TOTAL 1885.	TOTAL 1884.	TOTAL 1883.
277	250	47	249	31	854	780	612

CONSUMPTION OF SUGAR IN EUROPE FOR THREE YEARS, ENDING
31ST JANUARY, IN THOUSANDS OF TONS, TO
NEAREST THOUSAND.

Great Britain.	France.	Holland	Germany (Zollverein)	Four other entrepôts.	TOTAL 1885.	TOTAL 1884.	TOTAL 1883.
1117	469	46	376	314	2313	2260	2126

ESTIMATED CROP OF BEET ROOT SUGAR ON THE CONTINENT OF EUROPE,
FOR THE ENSUING SEASON, COMPARED WITH THE ACTUAL CROPS
OF THE THREE PREVIOUS SEASONS.

(From Licht's Monthly Circular.)

	1884-85.	1883-84.	1882-83.	1881-82.
	Tons.	Tons.	Tons.	Tons.
France.....	325,000	473,676	423,194	393,269
Germany(Zollverein).....	1,150,000	986,403	848,124	644,775
Austro-Hungary....	525,000	445,952	473,002	411,015
Russia and Poland ..	335,000	307,697	284,991	308,799
Belgium	85,000	106,586	82,723	73,136
Holland and other Countries.....	50,000	40,000	35,000	30,000
Total.....	2,470,000	2,360,314	2,147,034	1,860,994

Mr. Licht makes no alteration in his estimate for this month. For the changes made since the opening of the present campaign see last month's *Sugar Cane*, p. 167.

STATE AND PROSPECTS OF THE ENGLISH SUGAR MARKET.

The improvement in the raw sugar market, which we noted last month, has continued through March, the market for all kinds of raws closing firm at the highest prices of February, and in some cases 3d. to 6d. advance. Beet 88 per cent. f.o.b. is 12s. 3d. prompt, 12s. 6d. May.

This improvement has not extended to refined sugars, the demand for which is most discouraging, and nearly all descriptions have suffered a decline. Tate's Cubes are 20s., which is the price they were last December, when raw sugars were fully 2s. per cwt. less than now.

American refiners, aided by their export bounty, have sold granulated in London, at 16s. c.i.f., whilst the price in their own market was 6c. per lb., or 28s. per cwt.

At page 174 we give the shipments from Hamburg of raw beet sugars from January 1 to March 14; from which it will be seen that more than 30,000 tons, out of a total of 110,000 tons, have gone to the United States.

The opinion that there will be a large diminution in the extent of this year's beet planting seems to be growing, under the idea that the increased import duties on cereals in France, Germany, and Austria will induce many farmers to turn their attention to growing corn. If prices should remain where they are for the next two months, this hope may be realized. If, on the other hand, speculation should set in, and prices forced up another 1s. or 2s. per cwt., we may expect to see, in 1885-86, a repetition of 1884-85. At present all is conjecture.

On the 21st March, 1885, the deliveries show a decrease of 9901 tons, as compared with the corresponding period of 1884; and the imports show a decrease also of 12,731 tons.

The imports of American refined, for February, 1885, amounted to 3166 tons against 297 tons in February, 1884.

The stocks in the United Kingdom, on the 21st March, were 283,655 tons, against 262,255 tons in 1884, and 218,014 tons in 1883.

Present quotations for the standard qualities, as under, are:—


FLOATING.		Last Month.
Porto Rico, fair to good Refining	12/3 to 12/9	against 12/- to 12/6.
Cuba Centrifugals, 96% polarization	14/- to 14/3	„ 14/- to 14/3.
Cuba Muscovados, fair to good Refining..	12/3 to 12/9	„ 12/- to 12/6.
Bahia, middling to good Brown, No. 7 to 8½	10/- to 11/6	„ 10/- to 10/6.
Pernambuco, good to fine Brown	12/- to 12/3	„ 11/6 to 12/-.
Java, No. 14	14/9 to 15/-	„ 14/9 to 15/-.
LANDED.		Last Month.
Madras Cane Jaggery	9/- to 9/3	against 8/9 to 9/-.
Manilla Cebu and Ilo Ilo	9/- to 9/3	„ 8/9 to 9/-.
Paris Loaves, f.o.b.	17/3 to 17/6	„ 16/9 to 17/3.
Titlers	18/-	„ 18/9
Tate's Cubes	20/-	„ 21/-
Austrian-German Beetroot, 88% f.o.b. ..	12/3	„ 12/-

THE SUGAR CANE.

No. 190.

MAY 1, 1885.

VOL. XVII.

 The writers alone are responsible for their statements.

N.B.—All communications to be addressed, and Cheques and P.O. Orders made payable to HENRY THORP, Ducie Chambers, 57, Market Street, Manchester.

For Scale of Charges for Advertisements, see page xi.

For Table of Contents, see opposite the last page of each Number.

ERRATA.—In April *Sugar Cane*.

Page 204, under the head "Russian Sugar Industry," 7th line from top, for competition, read consumption—

Page 174, 4 lines from bottom, for Portsmouth, read Plymouth.

„ 216, 10 lines from top, for £840,000, read £800,000.

„ 216, 13 lines from bottom, for Cabal, read Cuba.

We learn that the United States Finance Minister, has appointed a Commission, to enquire into, and report upon, the present working of the system of drawbacks upon the export of sugar.

Just as we are going to press, we have received from the author, M. François Sachs, Part III. of his interesting "Revue universelle des progrès de la fabrication du Sucre" for the years 1883-84. We purpose in our next number giving a further notice of it.

A Parliamentary paper (Commercial No. 4), has recently been issued containing a "Correspondence respecting the negotiation of a Treaty regulating trade between the British West Indies and the United States;" a fuller notice of which will be found at page 256. It can be procured from Harrison & Sons, London, or through any bookseller.—Price 3½d.

We read in Messrs. Willett & Hamlin's New York Sugar Report of April 16 that a steamer of 1000 tons was loading a full cargo of refined for Greenock, but that the recent rise in freights has now stopped all new export business. The same report says

that some estimates now place the Cuba crop below 500,000 tons, but it may reach 550,000 tons, of which 100,000 tons at least will go to Spain, and 50,000 tons elsewhere and into local consumption, leaving 400,000 tons for the United States. In 1884 the crop was 549,038 tons, and of this 475,085 went to the States.

Mr. W. Newton, the President of the Chamber of Agriculture of Mauritius, has been urging upon the planters of that colony to make an appeal to the scientific world by offering a premium for the discovery of a process by which more juice can be extracted from the cane, and a greater quantity of sugar from the juice, than is now being got, at a minimum of cost. He says in effect, "Let us promise a premium sufficiently high to tempt the greatest savants, say of 200,000, 300,000, or even 500,000 rupees, according to the results obtained. Whatever may be the amount of premium to be paid, it will be a small matter in comparison with the advantages which the sugar planters would derive from such a discovery." We sincerely hope that Mr. Newton's appeal will be responded to, and that some *really practical* results may arise out of it.

We have received from the Anti-Bounty League, 53 and 54, Chancery Lane, London, a coloured "Diagram illustrating effects on British Home and Colonial Sugar Industries of the Foreign Export Bounty System." It consists of eight squares, in two rows, each row containing a series of circles drawn to scale. The upper series show the average imports of British, Foreign, and Continental sugars for the ten years 1852-61, which may be termed the Anti-Bounty period; and the lower series show the imports as they were in 1884, the bounty period. The following are the percentages:—

	1852-1861.	1884.
Beet, not bounty-fed	6 per cent.	— per cent.
Bounty-fed Beet and American refined —	„ ..	51 „
British Colonial	63 „ ..	21 „
Foreign Colonial (Cuba, &c.)	30 „ ..	26 „
Unenumerated	1 „ ..	2 „
	100	100

It also shows what would have been the proportional per centages for 1884 had the relative proportions of the Anti-Bounty period been maintained.

The diagram is ingeniously conceived ; and after a little study it appears very simple and effective, and is calculated to be of service, especially as showing, almost at a glance, the great changes that have been brought about by the operation of the foreign bounties in the movements of sugars.

It will not surprise many of our readers to learn that the beet-sugar experiment which has been tried at Lavenham, has not turned out a success. Thousands of tons of beetroot were delivered in due course, and after a few weeks' working we learn that the factory is closed. The roots are lying at the factory, dried up, or partly rotten, and are being sold to the farmers at nominal prices, for feeding purposes.

It is reported, that the promoters intend converting the works into a sugar refinery ; which would indicate, that, in their opinion, beet growing in England, for sugar purposes, is hopeless.

We regret to have to record such a state of things, for if we must have beet-sugar, better that it should be British grown than that we should have to depend upon foreign supplies.

In the *Sugar Cane* for May, last year, page 229, we gave a short notice of this undertaking, from which our readers would see that we were not very sanguine of its proving a success. In the same number, page 257, we gave an account of the inaugural dinner at Bury St. Edmund's, on April 9th, 1884.

Unsatisfactory as beet-growing has proved in England, matters are not much better on the Continent. A warm controversy is being carried on between the fabricants, on the one hand, and the cultivators of beetroot, on the other, as to the price to be paid for the roots, and the conditions under which they shall be grown. The following are the principal features of a form of contract adopted by one large factory :—

The beets must not be grown on swampy, moory, or rotten soil ; the ground must not be manured with sheep dung, sewage, or nightsoil. The growers must obtain the seed, which must be either Vilmorin, or the best sorts, only from the factory, which will deliver them at 30 M. (30s.) per cwt. The beets must be sown, set out, &c., at proper time, and regularly attended to. The time of delivery to be from 1st September to the end of the campaign. If delivered too rapidly, the receipts may be suspended for eight days, or if frost should supervene, more than eight

days. The time for receiving is fixed from sunrise to sunset, with an interruption of an hour at noon. The fields, where the beets are being cultivated, can be inspected during the summer time, by two or three of the *employés* of the factory, who may cause defects to be remedied. The beets must be topped as far as where the leaves commence; hollow beets must be cut away as far as the cavities extend. Beets with large hollow heads, the percentage of head being more than 5, may be refused by the factory. The price of beets for September to be 90 pf. (?); October to November, 80 pf.; and from 1st December forward, 90 pf. 25 per cent. of slicings are to be delivered gratis, and carriage free, to the cultivator; if he wants to have 35 per cent. they will be delivered gratis, but not carriage paid.

Under such stringent conditions as are here laid down, disputes are very likely to arise; and to meet these, a clause is inserted in the contract by which reference is made, in the first place, to the official director; in the second, to an arbitrator; and in the third, should both the previous references fail to satisfy, to three men of good position (*Obmänner*), who must neither be shareholders nor cultivators.

The factory to advance to the cultivator, if required, 30 M. per morgan (50s. per acre) on security.

Such stipulations as are here set forth, will help to decide those who may be hesitating whether to cultivate beet, or to try something else. The feeling is growing, that the reduction in this year's sowings in Germany, Austria, and France will be large; in some places, where the factories are not abreast of the times, the reduction will be 50 per cent., in others, more favourably situated, the reduction may not be more than 20 per cent. Until May is out, it is impossible even to approximate what the general reduction will be; but from present appearances, 20 per cent. would not seem to be an extravagant estimate. Assuming the conditions of the two years to be same, this would mean a reduction in the three countries, Germany, France, and Austria of 400,000 tons; but we may expect that the average percentage of yield in sugar will be greater in the coming, than in the past campaign, inasmuch as the reduction in the production will be greatest in those factories giving the poorest results. The total reduction, in sugar, will, therefore, not be in the same proportion as the reduction in the sowings.

SUGAR NOTES: No. 2.—SACCHARIC ACID.

By Dr. T. L. PHIPSON, F.C.S., F.S.C.I., &c.

Saccharic acid is another remarkable and little known derivative of sugar. If it were well known I should not write about it. Nevertheless, this acid was discovered a long time ago by the immortal Swedish chemist Schéele, the forerunner of Berzélius and contemporary of Lavoisier and Priestley—men to whom science is indebted for the foundation of modern chemistry.

Schéele, when he first obtained it, imagined it to be the acid of the apple, malic acid, but it was shown afterwards, by Guérin-Varry, a French chemist, to be more closely allied to oxalic acid, and he termed it *oxulhydric* acid. Later still it was discovered that in many of its properties it resembled tartaric acid, and Liebig found that it could be easily converted into tartaric acid. Here it was thought we had at last found a means of obtaining *artificial tartaric acid* from cane sugar, which would prove a new and economical source of this important acid so largely used in the industrial arts and in medicine.

It is not uncommon to hear the solution of lime in water containing sugar mentioned as “saccharate of lime,” as we also hear compounds of sugar and oxide of iron, used in pharmacy, spoken of as “saccharate of iron.” These preparations contain no saccharic acid; they are simply compounds of sugar with lime and iron oxide, and should, properly speaking, be termed “sucrates.”

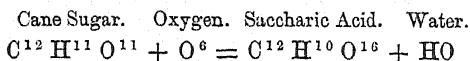
Saccharic acid is a very remarkable substance obtained by oxydising sugar by means of nitric acid, care being taken not to let the action proceed so far as to convert the sugar entirely into oxalic acid. This oxydation is carried out by means of nitric acid diluted with a certain amount of water. Perhaps the best method of proceeding is as follows:—

One part of cane sugar is heated with three or four parts of nitric acid of the specific gravity of 1.27 until gas begins to be given off; the flask is then taken from the fire and allowed to cool to 60° centigrade, at which temperature it is maintained until the liquid has become quite brown. A certain quantity of oxalic acid

is deposited, for it is difficult, if not impossible, to prevent its production along with the saccharic acid. The liquid separated from this deposit is saturated by means of carbonate of potash, and afterwards acidulated with acetic acid. It is then carried to a cool place, and allowed to remain at rest for some weeks, at the end of which time a deposit of crystals—which are the *acid saccharate of potash* (bi-saccharate of potash, corresponding to bi-tartrate of potash)—will have formed. These crystals can be pressed, washed, and purified by one or two crystallisations from boiling water. To obtain saccharic acid from this potash salt, it has been recommended to dissolve it in boiling water, neutralise it with potash or ammonia, and whilst boiling precipitate it with a soluble salt of cadmium. The *saccharate of cadmium* thus produced as an insoluble substance is suspended in water, and decomposed by sulphuretted hydrogen, and, the sulphide of cadmium being filtered off, the liquid (containing now nothing but saccharic acid) is evaporated to dryness.

This process may appear long and complicated, but in reality it presents no serious difficulties, and is tolerably rapid. Moreover, all the expensive cadmium is recovered, and can be made to serve over and over again. But the yield is not complete; a certain amount of saccharic acid escapes into the various “mother waters,” and has to be recovered. Besides the oxalic acid produced, there is a yield in a well-conducted process of an amount of saccharic acid equal to about 11 per cent. of the sugar used.

Thus obtained saccharic acid is a colourless, friable, non-crystalline substance, the composition of which is represented as: $C^{12} H^{10} O^{16}$, by which it will be seen that it is derived from sugar by the addition of a considerable amount of oxygen:—



Saccharic acid is liable to draw moisture from the air, and become deliquescent; it easily dissolves in water and in alcohol, but is insoluble in ether. When its solution in water is kept in a water bath at the temperature of boiling water it becomes brown. This solution easily reduces chloride of gold, which points to its

possible use in photography. When heated the aqueous solution of saccharic acid reduces the ammoniacal solution of nitrate of silver, which circumstance has already been taken advantage of in producing deposits of silver on glass (silvered mirrors, &c.). By the action of nitric acid saccharic acid is converted into tartaric acid, and then into oxalic acid. Heated with caustic potash it is transformed into acetic and oxalic acids.

Such are the principal properties of this interesting product derived from cane sugar. With regard to its salts, it forms like tartaric acid both neutral and acid salts. The acid salts are mostly crystalline, and the bi-saccharate of ammonia and bi-sacchrate of potash can be obtained easily as crystalline precipitates like the corresponding bi-tartrates.

This is not the place to examine all the various saccharates that have been obtained, but we foresee many uses to which some of them could be applied, and with the present low price of sugar saccharic acid and its compounds should become a subject of special interest to the calico printer, the dyer, the pharmacist, and others.

EXPORTS OF RAW BEET SUGAR FROM HAMBURG, 1885.

	Mar. 4 to April 11.		Jan. 1 to April 11.
	Tons.		Tons.
To London	8386	....	31103
„ Liverpool	3450	....	12860
„ Greenock and Leith	14206	....	47340
„ Plymouth, Bristol, and Ireland	1125	....	4355
Total for Great Britain and Ireland	27167	....	95658
„ France	2975	....	9239
„ Holland	2070	....	6935
„ Portugal	70	....	70
„ Italy	1430	....	1430
„ United States	5426	....	36066
	<u>39138</u>	....	<u>149398</u>

DOUBLE CRUSHING.

Abstract of a letter to the *Indische Opmerker*, from J. W. A. VAN SOEST.

Translated from the Dutch, by JOHN M. C. PATON.

When the megass is treated with water or steam on its way from the first to the second mill, it is usual to extract as much juice as possible while the cane is passing through the first mill. This means an extraction of juice equal to, say, 68 to 70 per cent. from the first mill. After such a severe crushing it is evident there is no "vehicle" left to take up the remaining portions of the soluble sugar, and the necessity for wetting or damping, by means of either steam or water, becomes at once apparent.

During the last four seasons I have followed a different method of working. I prefer to pass the cane through the first mill with the rollers set up rather easier than usual, and to permit the megass to pass on to the second mill with sufficient moisture left in it to make it clearly advantageous to press a second time.

When I subject the cane to a single pressure in two independent mills, working in the ordinary way, I obtain juice equivalent to 70 to 71 per cent., but the yield is found to be from 136,000 to 144,000 liters only in the day of twenty-four hours. On the other hand, when the cane is passed lightly through the first mill, and then the megass thoroughly pressed in the second mill, the amount of juice is raised to 192,000 liters, and the percentage extracted is increased to from 75 to 78 per cent.

When double crushing in the manner just described there is not only a better extraction of juice from the cane, but, in addition, the amount of cane is dealt with in a shorter space of time. The greater part of the juice is expressed in the first mill, while the second mill ensures the extraction of as much as possible of the juice remaining in the partly crushed megass. With single crushing I have never been lucky enough to obtain 75 to 78 per cent., but could only ensure 70 to 71 per cent. by very careful attention to the regular feeding of the mill, to the maintaining of a steady pressure of steam, and at the same time running the mill more slowly than usual.

The loss of time just indicated is most important, and when running slowly, and crushing heavily, the danger of breakdown is much increased.

I have been informed that several sugar planters have followed my

method of working with more or less success, but most of them secured practically the same results as myself.

I have never attempted to damp the partly crushed megass with either water or steam, as it has always been my conviction that no satisfactory result would arise from so doing. It has always been my impression that the disadvantages would greatly outweigh any slight advantages which might result. It would certainly be an advantage if some one would make careful experiments to show what improvement results from the addition of either steam or water.

Careful tests are the best evidence on all these points. Now is the time when careful experiments should be made and the results made public.

In the same letter Mr. van Soest says, in reply to a correspondent, "Trashing," or removing the dry leaves from the stalks of the canes, may not be attended with good results in every case, and it may happen that, on grounds which dry quickly, trashing on a large scale would be an injury rather than a benefit.

Consequently, although I have found it beneficial on my estate, it does not follow that it would be equally good in every case. My estate is situated in a rather cool and damp district. Stripping off the dry leaves consequently has a good effect, because it admits both air and light, and other estates under similar conditions would doubtless also derive benefit from it.

It is true the dry leaves are lost as fuel for use during the grinding season, but to my mind this is no reason for omitting to trash, and so to assist the formation of sugar in the cane.

If, by the admission of light and heat from the sun (and both are necessary for the production of sugar), the cane can be more perfectly matured, and juice at a higher density produced, then it appears certain the gain in sugar is greater than the loss of fuel.

It must be noted that not only is the production of sugar increased, but, in addition, the juice is cleaner and easier to work. This enables manufacture to be carried on more quickly, with consequent saving of expense. Reduction in the amount of fuel used is not the least of these savings.

With regard to cane cuttings for planting, I have never advocated "soaking" them in water, as I believe much of the food for the young cane is lost by so doing.

I do recommend washing for a short time in a stream of running water, the object being, not only to remove dirt, but also to wash off such small insects, or their eggs, as are frequently found on the cuttings.

FERMENTATION.

By R. H. HARLAND, F.C.S.

BEING THAT PART OF A LECTURE ON THIS SUBJECT, DELIVERED AT THE
INSTITUTE OF AGRICULTURE, SOUTH KENSINGTON, ON MARCH 30TH,
HAVING SPECIAL REFERENCE TO SUGAR.

In introducing the subject of fermentation to your especial notice this evening, reference will hereafter be made to the particular bearing which it has upon the agricultural pursuits of this and other countries. Of late years our knowledge of fermentation has been considerably increased by the researches of Pasteur and others, who have devoted considerable time and consummate skill to the elucidation of the various changes brought about in the transformation of starchy substances into sugar and alcohol by the aid of the *Torula* or yeast plant, and to such a pitch has our knowledge of this branch of science attained that there is now no difficulty in explaining and tracing the action of the various ferments.

There can be little doubt that in the future, and probably in the immediate future, the subject of fermentation will have considerable bearing upon agriculture. We have all recently seen how the long, tedious process of haymaking can be effectually superseded by a process closely akin to fermentation; indeed, I might almost say by a process of fermentation, for there can be little doubt that the production of ensilage is attended by the conversion of some of the starchy matters of the green materials into soluble matters consisting, for the most part, of sugar, together with the formation of some amount of pleasant aromatic bodies which constitute the difference between sweet and rank fodder. You are all doubtless aware that ensilage is produced by storing several tons weight of green stuff in a confined space, preventing, as far as possible, the presence of atmospheric air. Pressure is necessary to squeeze out, if I may so term it, the particles of air which are necessarily entangled with the green material during the time that it is being placed in the pit or silo, as it is termed, and also to prevent access of air while the green stuff remains in the silo. At a later period of my lecture, when we understand a little more about the various changes brought about by fermentation, I shall explain to you what takes place in the silo, but at present I want you to notice two facts:—

1st. On opening a silo the outside portions of the several tons weight of green material are more or less rank and unfit for food; the inner portions are sweet and good. Now, why is this? Simply owing to the fact that fermentation has differed in the two cases. In the one a putrefactive decomposition has taken place; in the other the fermentation has been attended by the production of a group of aromatic compounds which go to make ensilage a nutritious food. Having thus shown you in what way fermentation is connected with agriculture, I must now proceed to explain to you the chemistry of fermentation. You are all more or less familiar with the pleasant odour evolved in the production of beer and malt liquors, and you are also aware of the fact that all fermented liquors contain alcohol. The preparation of alcohol by the fermentation of sugar and starchy matters has been known from very remote periods, and all nations, be they civilised or savage, understand the production of some form of alcohol. The Japanese have long prepared a sort of beer by a peculiar mode of fermenting rice, and all native tribes now understand the production of some form of strong water by the spontaneous fermentation of saccharine solutions.

Generally speaking, there are some exceptions; alcohol is the ultimate production of vinous fermentation. If we take starch in any grain—rye, wheat, barley, &c., it is represented chemically by the following formula $C_{12}H_{20}O_{10}$ by heating starch to a temperature of 500° Fahr., we expel some of its water and transform it into a substance known as dextrine or British gum—a substance which differs in all respects from the material with which we started in—being, 1st, soluble in water; 2nd, forming a sticky substance when dissolved in water; 3rd, in giving a purple colouration with iodine, instead of the deep blue produced by starch. If we moisten some of this dextrine with water, and add a small proportion of extract of malt, a further change will be produced in the course of a few hours—this change being attended by chemical action—the chemical action consisting in the dextrine, combining with more water than even the starch contained, and being converted into two sugars, known as maltose and dextrose. These sugars are quite distinct from the ordinary cane or beet sugars of commerce, and are known commercially by the general name of glucose. In order to make the connection between starch and glucose clear, and to assist in explaining to you the action of the malt extract, we will consider for a

moment what takes place (1st) when starch water is exposed to the atmosphere; (2nd) when wheat or barley flour is mixed with water and kept at a temperature of 140° Fahr. for a few hours; (3rd) when starch paste is mixed with extract of malt and kept at a temperature of 140° Fahr. for a few hours. If we expose some ordinary starch paste to the atmosphere for a few days, little or no change can be observed in its appearance, so far as its general appearance is concerned; it is still starch and water. If we apply the iodine test, we shall find that this gives no indication of change; it is evidently still starch, and exhibits all the reactions of that body. Instead of the prepared starch, we will take some wheat or barley flour, mix it with water, and stand it aside in the same way. We shall find that a considerable change has taken place, the liquid now having a sweetish taste. This same action is brought about in a few hours if the liquid is kept at a temperature of 150° Fahr. As we have not added anything to account for the change of the starchy liquid into a sweetish solution, it is evident that there must be some substance contained in the flour to account for the change which has occurred. This substance is the albuminous portion of the grain. It is contained in barley to the extent of 12 to 15 per cent. of the weight of the grain, and it is during the process of germination, to which barley is always subjected before becoming malt, that these albuminous substances are brought into the peculiar form of diastase. Diastase is known as a soluble ferment, inasmuch as it acts upon the starchy matters of the grain, converting them into dextrine and maltose, which are soluble. The diastase of malt is capable of converting a much larger proportion of starch than is contained in the grain. In order to produce dextrine and maltose directly from starch, it is only necessary to gelatinise the starch with boiling water, and to add a small proportion of malt extract, and to keep the mixture at 145° Fahr. The whole of the starch is speedily rendered soluble and transformed into dextrine and maltose in the proportion of two-thirds dextrine, one-third maltose. It is liquor prepared from starchy grains in this manner that constitutes brewers' or distillers' worts. You will readily understand what a powerful body this diastase is when I tell you that malt contains only one five-hundredth part of this substance, and one part of diastase is capable of converting no less than 2000 parts of starch into glucose or starch sugar. Well, now, the starchy matters of the grain having been thus changed into saccharine substances is


ready for the addition of yeast. Before, however, proceeding to explain the peculiar nature and action of the yeast plant, I must tell you that there is another method of converting the starchy matters of grain into starch sugar—a method which is extensively resorted to in this country, producing a product which is now generally made use of by brewers. This product is glucose, sometimes termed invert sugar—saccharum—dextrose, &c. I have several specimens of this substance on the table; but before drawing your attention to them, I will explain generally how this substance is prepared. Starch when acted upon by sulphuric acid is completely altered in its character. To bring about this change it is necessary to add sulphuric acid to a paste prepared by mixing the grain with cold water. Heat is now applied; and by boiling this mixture for some time the whole of the starchy matters are taken into solution. This liquor now consists of a mixture of dextrine and maltose, mixed with free sulphuric acid, for in this reaction the sulphuric acid is not destroyed, but simply assists the starch to take up one atom of water; this is the only chemical difference between starch and glucose, the sulphuric acid is carefully neutralised with chalk, the resulting sulphate of lime removed from the solution by filtration, the liquor evaporated down in vacuo yields the starch sugar, or glucose of commerce, a mixture of dextrine and maltose, similar products, which, you will remember, were produced by the action of diastase, only with this important difference, the conversion with sulphuric acid is only effected after long boiling; the conversion with malt extract takes place at a temperature of 140° Fahr., boiling the liquor or even heating it beyond the temperature mentioned is sufficient to destroy the diastase when the transformation of the starchy matters cease.

This thick viscid liquor is starch sugar, containing a large proportion of dextrine, which accounts for its sticky nature; this solid piece of white substance is also starch sugar, but more highly converted, that is, the boiling has been carried on either for a long time or under a pressure of 60 lb. to 80 lb. per square inch; in this case a further percentage of dextrine has been converted into maltose and dextrose, and the sticky nature of the dextrine has disappeared, rendering it possible to produce this substance in a solid form. And here is a third sample, which you will see differs from the preceding one by being almost pure white, and in the form of a powder; this has been more highly converted still, the dextrine and maltose being wholly con-

verted into dextrose. You will thus see that the action of sulphuric acid on starch produces a series of saccharine substances similar to those obtained by the action of the diastase of the malt. A solution of starch sugar in water cannot, however, be described as wort, as it lacks the extractive bodies derived from the grain, and it is, therefore, of use to the brewer for fortifying his worts with an additional amount of saccharine matter. The following analyses of barley, wheat, rice, &c., show the proportion of starch in each of their substances, and consequently the sugar-producing power of each of these materials, the remaining substances, albuminoids, ash, cellulose, &c., being got rid of during the process of manufacture, while in the case of conversion by malt extract the soluble matters are dissolved, and go to form the extractives of beer:—

	Wheat.	Barley.	Rice.
Water	14·7	12·0	14·2
Albuminoids	11·4	12·6	6·4
Starch	68·2	63·7	74·9
Fat	1·4	2·0	·8
Cellulose	2·6	7·1	3·0
Ash	1·7	2·6	·7
Sugar-producing Power ..	75·7	70·7	83·2

M. Dumas has made some remarkable experiments on fermentation. He has shown that it takes twice as long to ferment cane sugar as starch sugar, due, no doubt, to the fact that the cane sugar is first inverted into glucose before it becomes converted into alcohol.

2nd. When the proportion of yeast to glucose was twenty to one the fermentation was quite as rapid as when the proportion was 100 of yeast to one of sugar—in other words, yeast being in excess the duration of fermentation is proportional to the amount of sugar. The regularity of the reaction upon the sugar is caused by the great multitude of the cells taking part in the fermentation. By a calculation based on counting the number of cells in a microscopic field it would appear that each square millimetre contains about 19,000 cells. This small square  represents 5 square millimetres, and would contain 95,000 cells. Pasteur has also made some observations; upon grape juice he found that after ten hours he could detect only a couple of ferment cells. These cells were carefully watched, and in two hours these two cells had furnished eight, including the two mother cells, and the number would have been considerably increased had the tem-

perature been kept at 85° to 90° Fahr. This will give you some idea of the rapid rate at which these cells are multiplied, and of the enormous number of these minute plants that are engaged in fermentative processes. I cannot leave the subject of the yeast plant without explaining to you its extraordinary vitality. Its peculiarity in this respect is thus summed up by Professor Hartley, based upon some observations made by Melsens:—

1. Fermentation can proceed among melting ice.
2. Yeast immersed in water, enclosed in strong vessels, is capable of resisting compression caused by the effort to expand when water is frozen, even when the expansive force is equal to a pressure of 8000 atmospheres, or 120,000 lb.
3. The energy of the ferment is diminished but life is not destroyed by a degree of cold more intense than any artificially produced.
4. Alcoholic fermentation is suspended when the temperature is kept for some time at 120° Fahr.
5. Alcoholic fermentation is arrested when it proceeds in closed vessels, and when the pressure of the evolved carbonic acid exceeds 25 atmospheres or 375 lb., the yeast is killed.

Well, now, to proceed a step further. You have seen how starch can be converted into dextrine and sugar, and how the dextrine and sugar thus formed are further split up into alcohol, the substance which remains in the fermenting fluid, and carbonic acid gas which escapes. There is a further ferment, known by the name of bacterium aceti, which converts the alcohol into acetic acid or vinegar; in fact, nearly all fermentative processes are accompanied by the production of a certain amount of acidity, but it is only when this peculiar kind of ferment is growing in the liquor that the alcohol is transformed into acetic acid. There are also numerous other ferments known—in fact their name is legion—such as the numerous ferments producing the various peculiarities in the Continental cheese. The formation of mould, a growth which you have all often witnessed, is always accompanied by a process of decomposition or decay, sometimes resulting in the formation of useful and valuable compounds, and at other times producing unpleasant and noxious gases. This latter process is generally known as putrefaction, and results from a variety of causes, preventing or killing the growth of the useful ferment by

the introduction of foreign germs, which produce, by the decomposition of the same material, a variety of complex organic compounds. On putrefactive decomposition I shall not touch at any greater length than I have done, but I should like to draw your attention to some of the great researches of Pasteur and others, who have elaborated what is known as the germ theory. This theory has received much support from experiments tried by many eminent scientists. It is roughly as follows:—If we take a tube containing some turnip juice, and expose it to the air, it very soon commences to putrify. If side by side in another tube we place some turnip infusion which has been boiled, and the mouth of which has been plugged with cotton wool, we shall find that this will keep perfectly sweet and good for a long period. So it is with milk, infusion of meat, and other similar substances, providing the germs are killed by boiling and the entrance of fresh germs are prevented by filtration of the air through cotton wool the infusions will remain sweet and good for a considerable period, but if we removed the cotton wool the infusion rapidly commences to putrify. Many of these germs are actually living, and can be cultivated and multiplied on any suitable soil; in fact they reproduce themselves with extraordinary rapidity and in enormous numbers. A common form of these microscopical bodies is found in the air, and called by the general term of bacteria. There are, doubtless, countless myriads of these minute organisms floating about in this room at the present time, only waiting a suitable regenerative ground to multiply. They very speedily attack animal and vegetable infusions, the nitrogenous matters of which supply them with the food necessary for reproduction and existence. They are extremely difficult to kill; boiling seems to be the only safe method of killing them. It is a living organism or germ which has recently been discovered by Koch, and is said by him to be the true cholera germ. He is now engaged in cultivating a stock of these minute cholera organisms with a view to further experiment and prove the conditions under which this terrible disease is spread.

GERMAN CONSULAR REPORT (CONDENSED) UPON
THE JAVA SUGAR INDUSTRY.*(Rotterdam, 24th February, 1885.)*

The crisis which has lately broken out in connection with the trade of Holland with her Colonies is a sugar crisis. The production of sugar in Java has steadily increased during the past ten years. In 1875 the quantity exported was about 200,000 tons; in the present year the exports will probably reach 400,000 tons. Prices, on the other hand, are in an inverse ratio. Formerly the pikul (sack of about 60 kilos., or 132 lbs.) was worth 15 guilders (25s. for 132 lbs. = to 21s. 3d. per cwt.) Lately it has fallen to 9 and 8 guilders per pikul (15s. to 13s. 4d., or 12s. 9d. to 11s. 4d. per cwt); but it is asserted that at $6\frac{1}{2}$ guilders per pikul (= 9s. per cwt.) sugar could be produced there without loss. This can at any rate only be said of the Javanese factories which are most favourably placed as regards their mode of working, and have at command ample capital. In ordinary times, those who work with borrowed capital must pay $7\frac{1}{2}$ to 9 per cent. interest; for in Java the sugar manufacturer is also a cultivator. He requires for an undertaking of 400 "bouws" * (= to 640 English acres) from 140,000 to 160,000 guilders (£11,666 to £13,333). As the cane requires 12 to 18 months to grow, &c., the loan cannot under the best conditions be repaid under a year and a half, in the form of sugar to the lender, who charges a commission of $2\frac{1}{2}$ per cent. Therefore it costs the undertaker from 24 to 27,000 guilders (or £2000 to £2250) for each crop. If the rate of interest were raised by 2 to 3 per cent., the business of planting could not be carried on with prices as they are now; and yet this is the usual way in which financial matters are arranged. If a planter prospers, as a rule he goes back to Holland with his money, and his successor commences without any capital of his own. The most important question is, then, the providing of capital, which has up to now been tolerably readily supplied from Holland, and, indeed, was required to save some of the Joint Stock concerns from downfall. This will have to be, and is being, more than ever considered. The average turn-out in Germany is 2500 tons per factory; in Java it is only 750 tons. There are 125 large estates, which produce on an average 1500 tons. It is

* A "bouw" is equal to $1\frac{2}{3}$ acres.

the smaller ones which are in danger. All are trying to concentrate their operations, and to perfect and render them more speedy; but the well-known fact that the cane must be worked up while fresh is against this. Carriage from the interior to Samarang is exceedingly high, and is said to amount to as much as the whole freight from Samarang to Europe, or, according to circumstances, from 15 to 25 per cent. of the present prices of sugar. The export duty of 30 cts. (or 6d.) per pikul is equal to 2 per cent. at present prices, and should be taken off.

If the Government could see its way to do what is required, a reduction in the cost of production of 2 guilders (or 3s. 4d.) on the pikul (or 2s. 10d. per cwt.) would be possible. There is no likelihood of so much as this being granted, as the abolition of the duty would cost the State £91,600; and the Dutch East Indian Budget, of late times, has regularly shown a deficit. But a certain amount of reduction in the cost of production must certainly be looked for, and the Java sugar industry are looking forward hopefully to the contest, believing that they can hold on till prices improve. Whether such hopes will be realized it is impossible to say.

In the *Sugar Cane* for December, 1884, page 618, we inserted a letter, signed "Javanicus," showing the large profits (nearly £10 per ton) which, for some years previous to 1882, had been realized by planters in Java. The difference in the prices for the years spoken of, and the present, is nearly 12s. per cwt.—ED. S. C.

THE COOLIE DISTURBANCE IN TRINIDAD.

A Blue Book has recently been issued containing the correspondence respecting the recent coolie disturbance in Trinidad, at the Mohurrum festival, during which twelve immigrants were killed and about one hundred wounded by the fire of the police, with Sir H. W. Norman's report thereon. After an exhaustive inquiry, Sir H. W. Norman gives it as his opinion that no blame for the deplorable occurrence on the 30th of October attaches to the Colonial Government or to any of the persons concerned in carrying out their orders. He recommends, moreover, that the regulations for the Hosea festival issued and enforced in 1884 should continue to be enforced in the future. Sir A. E. Havelock, the Governor of the island, concurs in both the conclusion and recommendation of Sir H. W. Norman.

THE CRITICAL POSITION OF THE GERMAN SUGAR INDUSTRY.

From the *Deutsche Zuckerindustrie*.

A month ago, when prices of sugar began to recover from the unheard of depression to which they had been subjected, there seemed some hope that the worst danger was passed, and that a period of moderate but yet profitable ranges of prices was about to follow the disastrous year.

It is difficult to predict whether or no this hope will be realised; for an article which belongs to the commerce of the world is subject to the influence of many favourable or unfavourable accidents; its price is affected by the beet or cane crops, by the purchasing capacity of the consuming countries, by alterations in legislation, &c. Thus, for instance, any further advance in prices is checked by a circumstance, which would have been thought out of the question in the present position of the market, viz., the United States, in consequence of very cheap purchases of raw sugar, and their large bounty on exportation, are shipping large quantities of refined sugar to England, while at the same time German raw sugar is going to New York for refining. (It may be supposed that in this roundabout way beetroot sugar also comes back to England.)

In a similar way, or perhaps in another way, the conclusion of a Treaty of Commerce between the United States and Spain, may give West India sugar a preference over ours. In short, there is certainly a not unfounded hope that the worst is passed; but we cannot as yet speak of the certainty of a lasting improvement, as regards soundness, in the beet sugar industry.

Manufacturers are preparing for a somewhat long duration of low prices, reducing the price they give for beetroots, and trying in this way to keep their factories going. But this is only a temporary remedy. In so far as the fabricants or shareholders cultivate beetroots themselves they take out of one pocket—the agricultural one—what they put into the other—that of the manufactory; and in so far as they buy beets, they throw the loss on the cultivator alone. But how long can the latter go on selling beets under cost price? For it is indisputable that neither on our productive, but dear, soil, nor on the cheap but inferior soil of other provinces, can beets be cultivated for 70 to 80 pf. per cwt. (14s. to 16s. per ton). Whether this ex-

pedient serves the purpose a longer or a shorter time, one thing is certain, that it is carried out at the expense of the agricultural interest, and though it may finally lead to a material reduction of the production, and thus bring about higher prices for sugar, yet it is again the agriculturist who, by giving up the cultivation of a profitable product, will be brought into a worse extremity than was caused by the reduced prices of wheat.

Consequently, it being shown that the interest of the agricultural community, even without any pecuniary participation in the manufacture, goes hand in hand with that of the fabricant, it results that it must be the principal task of the agricultural associations to consider some permanent means of remedying the evil, and to render our beet production, as much as lies in human power, as constant as possible, and our factories better able to withstand the fluctuations of the world's market.

We do not stand alone in the assertion that all this may be attained by increasing the inland consumption, steady reduction of the tax on sugar, and the extension of the transatlantic consuming districts, by treaties of commerce. The Imperial Government also is earnestly and intelligently occupied with the solution of the question, but it requires the support of a certain amount of pressure on the part of those interested, and their task, especially in the Reichstag, would be lightened if they could point to numerous petitions from agricultural circles.

In this manner the apparently one-sided demand for help on the part of the sugar manufacturers, will be clearly shown to be, what it really is, one made in the general interests of the country. Only it is desirable that the Unions of the fabricants should themselves arrive at more harmonious conclusions than has hitherto been the case; nothing is more prejudicial than for those most nearly concerned to remain at variance as to the manner in which assistance should be afforded.

Finally we would mention another question of the day; the postponement of the payment of the tax on beet, which is now becoming due. It is notorious that many factories have already fallen victims to this year's crisis; and it is probable that an equally large number will sink under the difficulties which the payment of the tax during the next few months will cause.

The writer of the article winds up by strongly recommending that the Government should allow the fabricants an extension of three months, for the payment of the tax, interest being charged; in this way, a timely assistance would be rendered, without any loss to the State.

SUGAR CULTIVATION IN BENGAL.

For the following information on this subject, extracted from the Report of the Administration of Bengal for the years 1882-83 and 1883-84, we are indebted to Richard Blechynden, jun., Esq., of the Agricultural and Horticultural Society of India. The figures refer only to Bengal.—ED. S. C.

Sugar is manufactured both from the sugar cane and the date tree. The cultivation of the date tree and the manufacture of date sugar are extensively carried on in the districts of Furreedpore, Bhágulpore, Jessor, in parts of Nuddea, the 24 Perganás, and Khoolua. It is a popular and profitable business for the cultivators. The juice is extracted from the trees in the cold season. A tree yields five seers (or about 10lbs.) a season, and goes on yielding for twenty years or more. A bigah of land is sometimes planted out with as many as a hundred trees. Each tree gives the Ryot a clear profit of about six annas (about 9d.), and he also enjoys the advantage of raising a cold weather rice crop, on the ground occupied by the date garden. Goor, or molasses, and date sugar are largely consumed in the districts in which they are manufactured, and are also exported to Calcutta. In the Bhagulpore district, the annual outturn of goor is estimated at 115,000 maunds (76,666 cwt.), valued at 230,000 rupees.

In the district of Jessore, where the making of date sugar in India is a thriving and popular industry, there were 24,122 bigahs * under date cultivation during 1882-83. The outturn of coarse sugar during last year was 10,056 tons, and its average price was Rs.3. 6. 0. per cwt. The total value of sugar—refined, fine and coarse—was Rs.2,772,599 for sugar (cheenee), and Rs.2,073,642 for coarse sugar (goor).

The sugar cane, of which there are several varieties, is grown throughout the Province. It is most extensively cultivated in Patná, Rajshahi, and Cooch Behar, and Burdwan divisions, where the area planted is estimated at 114,000, 44,000, and 39,000 acres respectively. The total area under sugar cane in the Province, is about 250,000 acres. Of the native states, the Cuttack Tritutary Mehals have the largest cultivation, viz., 4,500 acres.

The cane is generally grown on high lands, which are not subject

* In Bengal, $3\frac{1}{4}$ bigahs or beegahs go to an acre; 24,122 bigahs are therefore equal to 7422 English acres.

to inundation, but are easily irrigative. The cost of cultivation and manufacture varies considerably in all the divisions. In some districts sugar and goor are manufactured for home consumption, while in others they are manufactured for home as well as for export to other districts. Three sorts of machines are generally in use for the extraction of the juice from the cane—(1) the ordinary native presser; (2) the County Churki; and (3) the iron mill of European construction, called the Beheea Mill. This mill has been successfully introduced in many parts of the Province, and its use has resulted in diminishing the cost of manufacturing sugar. There are several sugar factories and refineries in Bengal. In the Jessor district there are 57 factories; in the Madhutam sub-division of the Darbhanga district, there are 30 refineries. At Dumraon, in the Sháhábád district, there are extensive refineries. In Cossipore, in the suburbs of Calcutta, there is a large sugar factory. In the Shahabad district, where probably the largest quantities of sugar and goor are manufactured from the sugar cane, the outturn last year was 1,440,000 maunds, * value Rs.4,320,000.

During 1882-83, 577,578 maunds of refined sugar, and 817,931 maunds of unrefined sugar, were imported into Calcutta.

The details of the imports are as follows:—

	Refined Sugar. Maunds.	Unrefined. Maunds.
From Bengal	331,125	771,184
„ Behar	114,914	39,409
„ N.W.P. and Oude..	83,793	6,454
„ Madras	46,197	850
„ Bombay	139	...
„ Punjab .....	....	11
„ Other places	1,410	....
„ Chota Nagpore....	....	3
	<hr/> 577,570	<hr/> 817,931

The exports (inland) were 371,519 maunds of refined sugar, and 380,260 maunds of unrefined sugar; the exports by sea being 247,841 maunds, and 116,468 maunds respectively.

* The Indian Imperial maund, which is also the Bazaar maund, weighs 82½lbs., and this, we take it, is the standard adopted in the figures here given; the factory maund weighs 74½lbs. At Madras, the maund weighs 25lbs., at Bombay 28lbs., at Kurrachi 80lbs. The par value of the rupee is 2s.

A good sugar cane crop is ascribed as the cause of a remarkable expansion of the exports of sugar during the year. The quantity despatched from Calcutta, which was almost entirely consigned to the United Kingdom, rose from 16,133cwts. to 85,939cwts., or by 432½ per cent. The trade in this article, however, being even in so favourable a year as the past, on 4,296 tons, is insignificant, and would seem susceptible of much improvement. Sugar shows an increase of 86 per cent. (exported), which would, it is said, have been still larger but for the competition in the English market of beet sugar imported from Germany.

Exports 1882-83, and 1883-84, of sugar, sugar candy, and other saccharine products :—

	1882-83. cwts.	Value. Rs.	1883-84. cwts.	Value. Rs.
United Kingdom	156,146 ..	1,554,950 ..	213,604 ..	2,201,839
Austria	<i>nil.</i> ..	.... ..	155 ..	2,291
France	1,299 ..	17,895 ..	<i>nil.</i> ..	....
Australia	2,017 ..	19,250 ..	79 ..	1,239
Other countries	1,867 ..	26,519 ..	3,041 ..	42,408
Italy	<i>nil.</i> ..	.... ..	2,127 ..	16,380
China	4,068 ..	58,746 ..	2,652 ..	37,868
Persia.....				
Straits Settlements. }				
	165,397	Rs.1,677,360	221,658	Rs.2,302,025

THE WEST INDIES.

On April 16, Mr. M'ARTHUR asked the Under-Secretary of State for Foreign Affairs whether he would inform the House what was the present state of the negotiations for the improvement of commercial intercourse between the West India Islands and the United States and Canada.

Lord E. FITZMAURICE, in reply, said—Full information respecting the negotiations for improving commercial intercourse between the British West India Colonies and the United States will be found in the Parliamentary paper, Commercial No. 4, 1885. As stated at page 22 of those papers, Her Majesty's Government does not abandon the hope of coming to an agreement, and they are in communication with Her Majesty's Minister at Washington on the subject. There have been no negotiations with respect to Canada.

THE DETERMINATION OF MIXTURES OF MILK-SUGAR AND CANE-SUGAR.

By A. W. STOKES, F.C.S., and R. BODMER, F.C.S.

Amongst several beautiful and delicate methods introduced by Dr. F. Pavy, F.R.S., for estimating sugar, there is one in which a modified Fehling solution is used. In this process the oxide of copper, instead of being precipitated, is kept in solution by strong ammonia. So that, on slowly adding the sugar solution, the point where the Fehling solution becomes colourless is distinctly seen, without being masked by the usual dirty-red precipitate.

This method is recorded in some of the chemical text-books, but for some unknown reason has not yet received the general attention that it deserves. For delicacy and accuracy, combined with ease of working, it is far superior to any other method yet in use.

We have for some months past been engaged in a series of experiments to adapt this method to the requirements of those dealing with mixed sugars, especially in the case of condensed milks. In our hands the process works almost perfectly.

Dr. Pavy has found that if a mixture of cane sugar and milk sugar be boiled for seven to ten minutes, with a two per cent. solution of citric acid, the cane sugar will be inverted, but the milk-sugar will remain unacted upon.

Hence, given a mixture of the two sugars, it is only necessary to determine the milk-sugar direct by means of the modified Fehling solution in one part of the mixture; then to boil another part with citric acid, and determine the added reducing power, to obtain at once the percentages of the two sugars.

The Modified Fehling Solution consists of:—

34·65 grammes of Crystallized Sulphate of Copper.

170 ,, Rochelle Salt.

170 ,, Caustic Potash.

made up to 1 litre.

120 c.c. of this fluid, with 400 c.c. of ammonia (sp. gr. '88) are made up to 1 litre.

This ammoniated cupric fluid constitutes the Pavy solution.

10 c.c. of this = 0·005 glucose.

It is advisable to standardise the solution with a weighed quantity

of cane sugar (inverted). Exact quantities of the solution (we prefer 40 c.c.) are placed in a small flask; this fits tightly to a cork suspended by a short piece of india-rubber from a burette. The cork has a side tube to allow of the escape of ammonia. The india-rubber tube is compressed by a screw (devised by Dr. Pavy) which will allow a rapid stream or a very slow succession of drops to pass into the flask.

The burette is filled with the solution of mixed sugars, well diluted, the flask containing the 40 c.c. of ammoniated solution is attached, and is heated till the fluid boils. A slow succession of drops is now allowed to run in from the burette till the blue colour disappears. The reading of the burette is taken. The milk should have been diluted, so that from 6 to 12 c.c. may be used to decolourise the copper solution. The action of milk sugar on the copper solution is very slow, hence it must not be run in rapidly. On the other hand, it must be run in within a limited time, else oxide of copper will begin to deposit, owing to the evaporation of the ammonia. Should the oxide of copper begin to deposit before the liquid becomes colourless, the screw-tap must be closed, a fresh quantity of the ammoniated solution be taken in another flask, and the quantity of sugar solution shown by this partial titration must be added at once. This is boiled for a short time, and then the sugar solution is run in from the burette, a few drops at a time, till the liquid is decoloured,

It is exceedingly easy to over-run the proper quantity. Therefore it is advisable to take a third quantity of the ammoniated solution, and add to it at once 0.2 c.c. less than the quantity of sugar solution found necessary above, and then boil till the oxide of copper begins to deposit. If the blue colour does not disappear before this takes place, it is certain that the quantity before added is within 0.1 c.c. of the true quantity required.

Should the blue colour, however, disappear, it will be necessary to work backwards, adding each time 0.2 c.c. less than before, till the exact point is reached. After a little practice it will not be found necessary thus to retrace one's step more than once. Thus the milk-sugar is determined.

Meanwhile, another measured portion of the mixed sugar solution is boiled with two per cent. of citric acid for seven to ten minutes, This is cooled, neutralised, or rendered slightly alkaline with ammonia, and either made up to the same bulk, or preferably made

up to twice the original volume. This is titrated like the previous liquid.

We have now two readings of the burette; the first due solely to the action of the milk-sugar; the second due to the combined action of the milk-sugar and inverted cane sugar; the milk sugar has not been inverted.

A simple calculation will at once give the percentages of the two sugars present, or they may be found from an inspection of the table accompanying this paper.

There is great diversity amongst chemical authors as to the reducing power of inverted milk-sugar upon the ordinary Fehling solution.

It was essential to determine the reducing power of milk-sugar upon this modified Fehling solution. We found great difficulty in doing this, owing to the want of purity of most of the samples of milk-sugar. But at last, obtaining specimens found on the determination of their carbon and hydrogen to be pure crystalized samples, we have come to the conclusion that 100 parts of milk-sugar equal 52 parts of glucose or 49.4 parts of cane sugar in reducing power upon this liquid.

The process has been tried upon aqueous solutions containing known quantities of sugars. For instance, a solution containing—

1 per cent. of cane sugar and 0.75 per cent. of milk-sugar, gave
0.95 „ „ 0.76 „ „ by this method.

With ordinary milks its working is almost perfect. The analyses of three samples is shown below. In these each constituent was separately determined; the totals sum up fairly near to 100:—

	No. 1.	No. 2.	No. 3.
Water	87.700	88.58	87.69
Fat.....	3.240	1.98	2.92
Casein	4.000	4.77	4.19
Milk-sugar	4.348	4.16	5.36
Ash	0.720	0.76	0.74
	<u>100.008</u>	<u>100.25</u>	<u>100.90</u>

In No. 1 the casein was determined by Wanklyn's ammonia process. In Nos. 2 and 3 the casein was estimated by precipitation; this is a far less exact process than the former.

Next we took milks to which known quantities of cane sugar had

been added. As an illustration of the results obtained, as well as of the method of working, we give this example—

To a milk 3.25 per cent. of cane sugar was added.

Twenty c.c. of this was coagulated with citric acid, made up to 200 c.c. and filtered (solution A). (This coagulation, to get rid of the casein, is not necessary, though it renders the end of the reaction more easy to be seen.)

Forty c.c. of Pavy's solution took 8.5 c.c. for decolouration. Since 40 c.c. Pavy's solution = .02 glucose.

The solution contains $\frac{.02 \times 100 \times 10}{8.5} = 2.35$ per cent. glucose.

To convert this into milk-sugar—

$$\frac{2.35 \times 100}{52} = 4.51 \text{ per cent. of milk-sugar in the original milk.}$$

Boiled 50 c.c. (solution A) with one grm. citric acid for ten minutes, made up to 100 c.c. after neutralisation with ammonia.

Forty c.c. Pavy's solution took 7 c.c. of this for decolouration—

$$\frac{.02 \times 100 \times 20}{7} = 5.71 \text{ per cent. glucose.}$$

Subtracting from this the glucose found above as the equivalent of the milk-sugar—

5.71

2.35

We get 3.36 per cent. of glucose due to the cane sugar.

Converting this into cane sugar—

$$\frac{3.36 \times 95}{100} = 3.19 \text{ per cent. of cane sugar found.}$$

While 3.25 „ „ was actually added.

Other examples taken at random from our books show:—

Cane Sugar.....	Added.	—Found.
	2.90	2.82
	3.20	3.05
	5.50	5.68
	10.50	10.80

We have tried the effect of boiling mixed sugars with acetic, oxalic, and tartaric acids, but find that citric acid is to be preferred. We are aware that the use of this solution has been severely criticised by a member of the Society of Public Analysts, but we think this may have been from want of a sufficient trial of the fluid. Of course, if

the proportions of potash and ammonia are varied, the results will not be the same. This is equally true of the constituents of the ordinary Fehling solution, as the same critic has pointed out.

The usual method of determining the milk-sugar direct with Fehling solution, and then inverting both sugars with a mineral acid, and again determining the reducing power of the mixed inverted sugars, does not seem to give good results. It has been pointed out by Dr. Muter that to determine milk-sugar alone with the ordinary Fehling solution, an invariable procedure must be followed, and especial precautions be taken, otherwise different results will be obtained by each operator.

The fact that few writers agree as to the actual reducing power of inverted milk-sugar, seems to indicate that mineral acids have a varying action upon milk-sugar, according to the strength or dilution of the sugar solution.

By this method, the milk-sugar never being inverted, constant results can be obtained by all competent operators.

By the usual Fehling solution method, the casein must be precipitated from a milk, else ammonia will be formed by the action of the potash, and some oxide of copper may be kept in solution. In this process the milk may be used direct after dilution.

The ordinary Fehling solution will not keep; the ammoniated solution retains its strength indefinitely.

There is no muddy mixture of red particles and a bluish liquid to have to deal with. It is essential that the Pavy fluid be perfectly clear during the whole time.

DISCUSSION.

Dr. MUTER said that he had previously published a process on the same subject, its essential point being that it was based upon actual weighing of the two sugars—estimating the milk-sugar and ascertaining the cane by difference. Since then, he believed, many analysts had given up those methods to a great extent, and they now used the polariscope instead, and found they could apply it to this question. In the process then before them the only thing he perceived that was somewhat in want of discussion was whether the method of inversion was perfectly reliable or not. Mr. Stokes he understood to admit that it was a question of the length of time of inversion, whether he inverted all the cane sugar or not. With regard to these inversion processes, he knew that it was entirely a

question of the mode of working; all sorts of fractional inversions might be obtained by difference in working. It seemed to him essentially necessary that for the success of the process certain conditions should be laid down and exactly followed, or comparative results would not be obtained.

Mr. HEHNER said he would like to have heard some experiments as to the action of citric acid upon pure milk-sugar, to see whether it underwent any change, or was absolutely unaffected. The process used by the Excise Chemists for the detection of cane sugar in malt worts, viz., boiling for a very short time with a certain amount of acid, in which the cane sugar was said to be inverted and nothing else, appeared to him to be analagous to this method, but after all it was only a kind of a fluke how deeply the inversion proceeded. He should like to know whether it was not similarly a matter of chance in this case. As far as he could see the chief claim to novelty was the employment of citric acid for the inversion of cane sugar, and the actual process was independent of the use of ammonical Fehling solution. He believed that any other process of sugar determination would do quite as well. Mr. Stokes was mistaken in supposing that he originally looked unfavourably at Pavy's process. At first he got most satisfactory results, and was charmed with the process, but when he came to examine it more deeply he found that every alteration in the conditions made a tremendous difference in the result, and that a variation, which was quite within the limits of a chance experiment, entirely altered the result obtained. He thought that Soxhlet's experiments had established the right way of estimating, not only milk-sugar, but many other sugars, and in the new edition of Fresenius the method was very accurately described. By both the volumetric and gravimetric methods very excellent results could be obtained without using the Pavy solution.

Dr. DUPRE said that with much of the criticism he agreed. The value of estimating cane sugar was, of course, only in regard to condensed milks. Did not ordinary condensed milk contain cane sugar inverted? if so, the method just described would not be applicable.

Mr. BODMER, in reply, said that as to boiling they had made experiments on the action of citric acid, and found that if dilute solution were used the milk-sugar could be boiled for 35 minutes, and the reducing power of that milk-sugar would be perfectly unchanged. It was evident that 35 minutes was ample time to invert the cane

sugar, but they had generally found 10 minutes to be sufficient—seven minutes being the minimum. As to the behaviour of the blue liquid under different conditions, they standardised it against cane sugar, and after months it was unchanged. He had had liquids containing various quantities of sugar of various strengths, and did not find different results. If a certain amount of cane sugar were present, the results were almost exactly identical. As to hurrying being necessary, if the work were done according to the method laid down there was no occasion for hurry—having got an approximate test, then, if the colour had not disappeared, they added a little more, generally .2 c.c., when the colour would disappear, and there would still be time to boil without the oxide of copper coming down.

We append a table to facilitate the calculation of results.

Table showing percentage values in glucose, crystallised milk-sugar, and cane sugar, for 40 c.c. of Pavy's solution decolourised :—

c.c. Solution.	Glucose.	Milk Sugar.	Cane Sugar.	c.c. Solution.	Glucose.	Milk Sugar.	Cane. Sugar.
4.0 ..	0.500 ..	0.961 ..	0.475	7.0 ..	0.285 ..	0.549 ..	0.271
1 ..	.488 ..	.938 ..	.463	1 ..	.281 ..	.541 ..	.267
2 ..	.476 ..	.915 ..	.452	2 ..	.277 ..	.534 ..	.264
3 ..	.465 ..	.894 ..	.442	3 ..	.274 ..	.526 ..	.260
4 ..	.454 ..	.874 ..	.431	4 ..	.270 ..	.519 ..	.256
5 ..	.444 ..	.854 ..	.422	5 ..	.266 ..	.512 ..	.253
6 ..	.435 ..	.836 ..	.413	6 ..	.263 ..	.506 ..	.250
7 ..	.425 ..	.818 ..	.404	7 ..	.259 ..	.499 ..	.246
8 ..	.416 ..	.801 ..	.396	8 ..	.256 ..	.493 ..	.243
9 ..	.408 ..	.785 ..	.387	9 ..	.253 ..	.486 ..	.240
5.0 ..	.400 ..	.769 ..	.380	8.0 ..	.250 ..	.480 ..	.237
1 ..	.392 ..	.754 ..	.372	1 ..	.247 ..	.474 ..	.234
2 ..	.384 ..	.739 ..	.365	2 ..	.244 ..	.469 ..	.231
3 ..	.377 ..	.725 ..	.358	3 ..	.241 ..	.463 ..	.229
4 ..	.370 ..	.712 ..	.351	4 ..	.238 ..	.458 ..	.226
5 ..	.363 ..	.699 ..	.345	5 ..	.235 ..	.452 ..	.223
6 ..	.357 ..	.686 ..	.339	6 ..	.232 ..	.447 ..	.221
7 ..	.350 ..	.674 ..	.333	7 ..	.229 ..	.442 ..	.218
8 ..	.344 ..	.663 ..	.327	8 ..	.227 ..	.437 ..	.216
9 ..	.339 ..	.652 ..	.322	9 ..	.224 ..	.432 ..	.213
6.0 ..	.333 ..	.641 ..	.316	9.0 ..	.222 ..	.427 ..	.211
1 ..	.327 ..	.630 ..	.311	1 ..	.219 ..	.422 ..	.208
2 ..	.322 ..	.620 ..	.306	2 ..	.217 ..	.418 ..	.206
3 ..	.317 ..	.610 ..	.301	3 ..	.215 ..	.413 ..	.204
4 ..	.312 ..	.600 ..	.296	4 ..	.212 ..	.409 ..	.201
5 ..	.307 ..	.591 ..	.292	5 ..	.210 ..	.404 ..	.199
6 ..	.303 ..	.582 ..	.287	6 ..	.208 ..	.400 ..	.197
7 ..	.298 ..	.574 ..	.283	7 ..	.206 ..	.396 ..	.195
8 ..	.294 ..	.565 ..	.279	8 ..	.204 ..	.392 ..	.193
9 ..	.289 ..	.557 ..	.275	9 ..	.202 ..	.388 ..	.191

The Analyst.

FOREIGN SUGAR BOUNTIES.

On April 7, the half-yearly Council Meeting of the Workmen's National Committee for the Abolition of Foreign Sugar Bounties was held at their headquarters, the Trafalgar Hotel, Leman Street, Whitechapel, E. Mr. John M'Lean (Secretary of the Scottish Workmen's Association) took the chair. The main business before the meeting was to receive reports from the Clyde, Plymouth, Liverpool, Leith, and other ports, respecting the operation of the foreign bounty system.

The CHAIRMAN said that in 1862, previously to the commencement of the bounty system, only five per cent. of the total sugar imports came from the sources that were now subsidised by foreign Governments. That five per cent. represented about a total of some 24,000 tons of sugar; but, in 1884, such has been the increase in production, manufacture, and exportation of sugar on the Continent, that no less than a total of 614,000 tons of sugar, valued at from 10 to 12 millions sterling, had been imported into the United Kingdom, which amounted to 51 per cent. of the total imports, or ten times the per centage of what the Continental imports were before the bounty system. That involved a serious loss to British workmen, to our colonies, and to the employers.

Mr. KELLY (Organising Secretary to the Committee) reported that a deputation from the London Executive had waited upon a large number of candidates now seeking to represent in Parliament, the various divisions of the Metropolis, and that 19 out of 25 of them, embracing Liberals, Radicals, and Conservatives, had given their adhesion to the programme of this Association.

After much discussion, and when various reports were handed in, Mr. D. M'KIE (Canning Town Labourers' Association) moved, and Mr. E. BARRETT (London Dock Foremen) seconded, the following resolution:—"That this Council resolves to hold a mass meeting at the East End of London at an early date, to support Mr. C. T. Ritchie, M.P., in his endeavour to induce the Government to countervail the foreign bounties on sugar; and hereby calls upon all members of Parliament to assist the hon. member for the Tower Hamlets."

The resolution was unanimously carried, and a sub-committee appointed to arrange for the mass meeting, after which, the meeting closed in the usual manner.

THE WEST INDIA COLONIES AND THE UNITED STATES.

A Parliamentary paper* was issued yesterday containing correspondence respecting the negotiation of a treaty regulating trade between the British West India colonies and the United States. The correspondence with a view to the negotiation of such a treaty appears to have been opened by our own Government, the principal object which they had in view being to secure a reduction of the heavy customs duties, which prevent the sugars produced in the British West India colonies from finding a remunerative market in the United States. The United States enjoy, as a matter of fact, without express stipulation in any diplomatic agreement, complete most-favoured-nation treatment in these colonies, and Earl Granville, therefore, in the name of the British Government, asked that complete most-favoured-nation treatment should likewise be extended in the United States to articles, the growth, produce, or manufacture of the British West India colonies. In consequence of recent treaties, or of treaties which it is supposed are about to be negotiated, trade carried on between the United States and the Sandwich Islands, Mexico, Central America, the Spanish West India Islands, and San Domingo has been, or is likely to be, placed on a more favourable footing than trade between the British West Indies and the United States. Such a result, Mr. Sackville West submitted in a letter to Mr. Frelinghuysen, could not fail to be disadvantageous to the interests of the United States connected with the several British colonies. Earl Granville suggested to the United States Government that the object in view should be met this way—namely, that the stipulations contained in Article 2 of the treaty of 1815 should be extended so as to be made applicable to trade between the United States and the British West India colonies. To this suggestion Mr. Frelinghuysen replied on July 16, 1884—about six weeks after the receipt of the communication of our Ambassador at Washington—stating that the British West Indies were already in the enjoyment of the most-favoured-nation treatment, and that they could not receive special favours without negotiating a reciprocal treaty. In consequence of this answer, the questions involved were duly considered between the Foreign and Colonial Offices, with the result that on October 25 Earl Granville transmitted to Mr. West certain bases for a convention with the United States for

* See page 225.

a mutual reduction of the duties on the principal articles of trade between the colonies, including Jamaica and the United States. In the negotiations which followed, the United States Government desired a wider basis for the convention, and insisted that its advantages should not be conceded gratis to third parties under the most-favoured-nation clauses. A draft treaty was accordingly drawn up, embodying the wishes of the United States in the matter, and transmitted on December 5 by Mr. West to the Foreign Office. With regard to the value of this draft treaty, Mr. Neville Lubbock, who was appointed to confer with the British Ambassador at Washington in the negotiations, gave it as his opinion that the loss of revenue to the United States in respect of the proposed convention could not be estimated at less than £2,500,000. On the other hand, the amount of revenue which would be lost in the colonies under it he estimated at £180,000, while the revenue which would have been lost under the proposition submitted by Her Majesty's Government in the bases already referred to would have been about £250,000. Mr. Lubbock was therefore of opinion that the proposed convention would prove highly beneficial to our West Indian Colonies if it should become law. A very different opinion regarding it was, however, formed by Her Majesty's Government. In a long dispatch to Mr. West, dated February 12, Earl Granville rejected the United States' counter-proposal, and spoke of the "revolution which the principles it contains would, if universally accepted, effect in the value of the conventional stipulations as to commerce now existing between the various nations of the earth." In support of this condemnation, the noble earl then subjected the various articles to a searching analysis and criticism, pointing out a number of objections to the convention. The interpretation of the most-favoured nation clause involved in the United States proposals was that concessions granted conditionally and for a consideration cannot be claimed under it. From this interpretation Her Majesty's Government entirely and emphatically dissented. The most-favoured nation clause had now become the most valuable part of the system of commercial treaties, and exists between nearly all the nations of the earth. But should the system contemplated by the United States be widely adopted there would be a return to the old and exceedingly inconvenient system under which the same article in the same country would pay different duties, varying according to its

country of origin, the nationality of the importing ship, and perhaps also at some future time varying also with the nationality of the importer himself. A less general but equally serious objection to the proposals was, in the opinion of Her Majesty's Government, the restrictions it would place on the liberty of each party to deal freely with its own tariffs. Her Majesty's Government, however, did not abandon the hope of coming to an agreement in this matter, and Earl Granville suggested that the bases he had formerly transmitted could be modified so as to secure the ends in view without infringing the most-favoured nation clause as usually interpreted.—*The Times*.

MONTHLY LIST OF PATENTS.

Communicated by Mr. W. P. THOMPSON, C.E., M.S.C.I.,
Fel.Inst. P.A., Patent Agent, 6, Lord Street, Liverpool; and
323, High Holborn, London, W.C.

ENGLISH.

APPLICATIONS.

3574. WILLIAM R. LAKE, London. (A communication from abroad by Alphonse Helaers, Belgium.) *Improvements in and relating to filtering apparatus.* 19th March, 1885.

3784. WILLIAM WALKER, London. *Improvements in apparatus for extracting the water of condensation from sugar-boiling apparatus.* 24th March, 1885.

4332. ANDREW COOK, Glasgow. *Improvements in apparatus for reducing or disintegrating sugar canes or other vegetable substances.* 8th April, 1885.

ABRIDGMENTS.

1972. C. A. DAY, London. (Communicated from abroad by C. O. Foster, Brookline, Massachusetts, United States of America.) *Improvements in means and apparatus for bleaching sugar.* 12th February, 1885. This consists of a revolving drum set with its axis at a slope of a few degrees, and provided with a chute or passage for the sugar to enter it. The sugar in this chute has to pass the mouth of a pipe delivering sulphurous acid from a sulphur burner, impelled forward into the sugar by a steam blast; the sugar mixed with the sulphurous acid gas through the rotation of the inclined drum, escapes in a continuous stream at the other end.

7235. VICTOR DAIK, 25, Rue d'Achery, St. Quentin, Aisne, and ANTOINE LOUISE POSSOZ, 69, Avenue des Ternes, Paris. *Improvements in the extraction of sugar from molasses and other saccharine products, and in the quality of alkaline salts resulting therefrom.* 5th May, 1884. According to the inventors, if there is mixed cold (temperature from 0° to + 15° centigrade) saccharine

solutions of molasses, of beet, or of cane, juices of beet, and all saccharine solutions other than waters of exosmose, in such conditions that the contents of sugar shall be between 8 and 20 of sugar for 100 of water, and that there is mixed with them lime (anhydrous or hydrated in powder or in milk, but by preference anhydrous and in fine powder) in various proportions from 100 to 120 of lime (Ca O) for every 100 of sugar; the mixture made cold is not gelatinous; it preserves the fluid state, and can be passed to the filter press. But if we mix in the same conditions of temperature, of dilution and of proportion of the same pulverised anhydrous lime, for example, with solutions of molasses of concentrated exosmose to the said sugar containing liquors, and also to sugar containing liquors of higher proportions, this mixture cannot filter through the cloths of the filter press, it solidifies into a kind of consistent jelly; it is not fluid. We have observed that in raising the temperature beyond 40 degrees centigrade this gelatinous magma commences to fluidify, and especially by heating between 60 and 120 degrees centigrade, the gelatinous state is destroyed; there is produced an abundant pulverulent precipitate of a sucrate of lime entirely distinct, for this combination differs from other known sucrares by this solidified condition when cold, and by its other properties. This precipitate allows itself to be very well filtered, compressed, and washed by the filter press by hot water and steam. The inventors employ this re-action, using from 5 to 8 equivalents of lime to 1 of sugar; strontia or baryta can be used instead of lime.

7982. C. D. ABEL, London. (Communicated from abroad by Dr. Ludwig Harperath, of Cologne, Germany.) *A new or improved process for obtaining sugar from saccharine substances.* 20th May, 1884. This invention consists essentially in the use of calcined dolomite in place of lime for forming saccharates. By the use of this material, or an admixture of about one equivalent each of lime and magnesia, the development of heat on admixture is stated to be very slight, and very concentrated solutions of sugar can be treated. Methods are also described for heating the crushed beetroot or glucose mixture formed by treating potatoes directly with acids without first extracting the starch.

8502. J. IMRAY, London (in trust for Hippolyte Leplay, Paris). *Improved apparatus for osmose treatment of saccharine liquors.* The inventor shows that the economic problem to be solved for effecting a maximum elimination of the salts with a minimum elimination of sugar in a minimum of time would be to prevent the liquid in osmose from decreasing in density in equally great proportions. According to the present invention this result is produced in effecting the evaporation of the osmosed liquid in proportion as the indosmose current carries the water into the liquid in osmose, so as to maintain this liquid at nearly a constant degree of density. This operation is effected in the osmogene itself by means of a novel arrangement, which

may be designated under the name of "evaporative osmogene with strong osmose." The evaporative osmogene is arranged like the "Dubrunfaut" osmogene with 100 frames, as usually constructed, but with the following modifications: The upper parts of each of the frames are so arranged as to form a reservoir of liquid above all the frames, in which reservoir the liquid in osmose passes into each frame. The liquid in osmose passes out of each of the frames through holes arranged at the upper part of each molasses frame, and passes into the upper part of the osmogene forming the reservoir. The steam coil, arranged horizontally, is placed in a layer of osmose liquid contained in this reservoir, and serves for the evaporation of the osmose liquid in proportion as it passes from each of the molasses frames into this reservoir. By this means, in combining the action of the osmose, which decreases the density of the liquid in osmose and the action of the steam which effects evaporation, one can obtain at pleasure the degree of density desired, not only in the osmose liquid, but also in the liquid contained in the frames. In this way the inventor claims he can eliminate 75 to 80 per cent. of the salts against only 50 per cent. by ordinary osmogenes.

313510. SIMON C. MEYER, Philadelphia, Pennsylvania. *Machine for reducing bagasse to pulp to extract the saccharine matter therefrom.* 10th March, 1885. This invention consists in a series of cylindrical rasps, mounted partially within an inclined chute, and provided with adjustable teeth or cutters of coarse and fine pitch, for the reduction of the bagasse in rapid succession to as fine a pulp as may be desired.

GERMAN.

ABRIDGMENTS.

27973. FORSTREUTER BROTHERS, Oschersleben. *Improvement in evaporating apparatuses.* Addition to Patent No. 18863. 27th September, 1881. The steam chamber is divided into compartments by false floors fixed perpendicularly to the heating pipes, so that the steam flows in through an opening into the first chamber, then through an annular opening in the second chamber, then through a central opening in the third chamber, and through an annular opening in the fourth chamber, and, lastly, escapes through an aperture placed in the lower part of the apparatus.

28401. F. W. HERING & Co., Osterfeld, near Naumburg. *Sludge discharger for potatoes, and root-washing machines.* 6th March, 1881. The sludge discharger consists of a shaft which passes through a movable washer fixed in the discharge elbow pipe, and extends the length of the machine, carrying fixed and loose circular sludge scoops, and loose sludge scoops which adjust themselves to the floor of the wash trough. In order to stir up the sludge before discharging, the handle of the sludge emptier is turned, and the machine pushed backwards and forwards. On closing the discharge

opening the washer with the apparatus is pressed by means of the lever upon two oblique cams, and, after turning round, it is opened, and the washer and pipe resume their usual position.

28556. GUSTAV FRITSCHÉ, Schönau, near Neutitschein, Moravia. *Process for purifying root juices by aid of clay, preferably fuller's earth, in combination with burnt lime.* 31st January, 1884. From about 0·4 per cent. to 0·6 per cent. of the clay (fuller's earth), together with lime in quantity from about 2·5 per cent. to 4 per cent. of the weight of roots, are stirred into about twice or three times the volume of water, warmed to ensure a better solution, and heated with the raw juice to about boiling point. Many impurities, especially colouring particles from the juice, are thereby precipitated among the clay, so that the thick juice has a beautiful light colour, instead of its usual dark appearance.

27958. TELESPHORE TRIVIER, Fils, Quevaucamps, Belgium. *Apparatus for filtering sugar juices, syrups, and other liquids.* 1st January, 1884. The apparatus consists of a column, with three or more separate filters placed one over the other, which can be drawn close together by aid of a screw, and can also be raised or lowered by aid of sets of rollers for the purpose of changing the filters. Each filter consists of a short cylinder with a double bottom for steam, in which the juice first passes through an ordinary bag filter, then a hollow double cone composed of two strainers, filled with asbestos, boneblack, sand, or the like, and covered with filter cloth. Under the discharge valve of each filter the point of a rod projects from the filter placed directly underneath, so that the valves open when the filters are placed upon one another, and resume their usual position when these are removed.

28277. PAUL FRÉDÉRIC D'HENNEZEL, Liéz, Aisne, France. *Washing machine for roots and potatoes with removable stirrers.* 5th December, 1883. The roots enter the wash trough by a side funnel. The trough slopes towards the injector, and is connected by a pipe with a water-wheel. The water for washing enters at the other end, meets the roots and flows through the before-mentioned pipe into a pit, from whence it is raised together with the residue from the roots by the water-wheel. The stirrers are provided with cases with ratchet wheel teeth, which fit into one another when set in motion by an axle, and are held in position by pressure from both ends of the axle. The stirrers are sheathed with ribbed, channelled or grooved sheet iron.

28282. FRANZ POKORNY, Olmütz, Moravia. *Diffusion battery for direct juice extraction without overflow pipe, with juice distributors on the lids.* 1st January, 1884. The separate diffusers are not as before filled in order to draw off the concentrated juice first from below with juice, whereby the thick syrup is forced by pressure towards the saturaters, but the juice is

kept moving continually forwards. The diffusers are not connected by overflow pipes, but are placed in direct communication with one another. The juice distributors consist of staves which are fastened radially or parallel upon two, three, or more circular pieces of flat iron or similar supports fixed on the lid, and are arranged at some distance from the lid or sieve. By the use of these rods an open space is obtained between the parings and the cover or sieve, whereby the juice which flows in can circulate without hindrance in all directions.

28511. FRITZ SCHEIBLER, Burts-cheid, Aachen. *Process for covering sugar-loaves.* 8th August, 1883. The moulds containing the sugar-loaves are exhausted of air, being provided with covers from which all the air may be extracted, and then the clarifying liquid is let into them from a deep stationary reservoir through a pipe. The liquid penetrates the pores of the loaf from which all the air has been exhausted and collects in the hollow space of the cover. When the spaces are full the process is finished. The measure for the quantity of clarifying liquid required can be regulated automatically by the size of the cover.

28878. FRITZ SCHEIBLER, Burts-cheid, Aachen. *Process for covering sugar-loaves, segments, or blocks in the centrifugal.* 25th September, 1884. The process is a continuation of the one described under No. 28511 for purifying in the centrifugal. The centrifugal drums, which are protected with a cover (or in the case of centrifugals with perforated sides), are released. Under atmospheric pressure the clarifying liquid enters the drums (which contain the loaves already freed from the raw syrup), from a deep stationary reservoir the liquid circulates through the sugar, and on the surplus liquid, after opening the air-cock by a pipe fixed in the clarifying reservoir, being run off, the loaves are quickly dried.

27752. J. F. LEHNARTZ, Dellbrück, near Cologne-on-the-Rhine. *Improvements in root cutting machines.* The knife boxes, which are fixed upon the periphery of a cone or cylinder rotating round a vertical axis, are inserted from above between every two posts, they thus remain firmly fixed in the cylinder without requiring further fastening. The posts have three cornered ribs which fit into corresponding grooves in the knife boxes. The beetroot delivery apparatus is not fixed in the customary way perpendicularly over the machine, but side-wise and tangentially against the cylinder. It is either made in gridiron form or out of perforated plates, so that any small stones clinging to the roots fall through during their passage to the cutting machine.

27828. BRUNSWICK MASCHINENBAU-ANSTALT, Brunswick. *Extracting sugar from molasses by aid of lime* (addition to Patents Nos. 26923 and 26925). 3rd July, 1883. For washing out the saccharate of lime obtained in the manner described in the principal patent, lime water, or water charged with lime, is

used as the saccharate of lime partially dissolves in pure water with formation of soluble compounds of saccharate of lime, and thus a loss of material is the result. To avoid this, lime water is used, and powdered lime obtained from burnt lime is stirred into the saccharate of lime, and mixed therewith with lime water in order to convert any saccharate which has become soluble into the insoluble form again.

AUSTRIAN.

26553. ALOIS VOLTER, Königgrätz, Austria. *Continuous extracting apparatus for saturated sugar juices.* 5th August, 1883. The apparatus consists of a series (six) of high extracting cylinders, provided with glass peep holes, and of a pipe and valve net connected together, which resembles the one used in a diffusion battery. The juice to be clarified enters at its underneath part, and the finished juice flows away through pipes fixed at a distance of about $\frac{2}{3}$ the height of the cylinder. The charging and discharging pipes are connected together by a system of overflow pipes and valves, in such a manner that the clarified juice ascends from one vessel into the other, and thus the whole series, up to the one in which the sludge is deposited, can be emptied. Besides these, a water force pipe is connected with the charging apertures of all the deposit cylinders, which provides the water for extracting the saccharine juice from the sludge, and a carbonic acid pipe for the after saturation of the clarified juices; likewise a conducting pipe for steam or compressed air, communicating with the upper part of the cylinder, in order to further the process of forcing the contents of one vessel into the other. The working of the apparatus is such that the progress of the clarifying of the juice can be watched through the glass peep holes, and, as it passes from one cylinder into the next, the quality of the juice in the former cylinder is supplemented by juice out of the preceding cylinder, and so on to the first cylinder. The thick sludge left behind in the first cylinder is mixed with fresh water for the purpose of lixiviation and left to settle; the saccharine water is then placed in the next vessel, the lixiviated sludge emptied, the cylinder cleaned, and again filled with fresh sludge juice; meanwhile the process of lixiviation is going on in the next cylinder, and so on. In this manner the machine is kept in continual operation.

Patentees of Inventions connected with the production, manufacture, and refining of sugar will find *The Sugar Cane* the best medium for their advertisements.

The Sugar Cane has a wide circulation among planters in all sugar producing countries, as well as among refiners, merchants, commission agents, and brokers, interested in the trade, at home and abroad.

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(Continued from page 215.)

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 XLIX. Laws of Barbados, from 1643 to 1762. By Richard Hall.
 4to., 1762.
 L. Description of the Spanish Islands and Settlements on the coast of the West Indies. 32 maps and plates. By Thos. Jeffery.
 Small 4to., London, 1762.
 LI. An Account of the Spanish Settlements in America.
 1 vol. 8vo. Edinburgh, 1762.
 LII. The Sugar Cane: a Poem in four books, with notes, by James Grainger, M.D., &c. 151 pp., 12mo., Dublin, 1766.
 ** The notes are numerous and very interesting. The author in his preface speaks thus:—"I have often been astonished that so little has been published on the cultivation of the sugar cane,

"while the press has groaned under folios on every other branch of
"rural economy."

- LIII. Code de L'Isle de Martinique, avec Supplément.

2 vols. folio, St. Pierre, 1767-72.

- LIV. Bellen N. Description Geographique des Debouquemens
quisont au Nord de l'Isle Saint Domingo. Versailles, 1773.

- LV. The History of Jamaica, or, General Survey of the Ancient and
Modern State of that Island: with reflections on its Situation,
Settlements, Inhabitants, Climate, Products, Commerce, Laws
and Government. Illustrated with Copper Plates. By Edward
Long. 3 vols. 4to. London, 1774.

NOTE.—A work of sterling merit; copies of this book have realized
as much as £14 14s.

- LVI. Acts of the Legislature of the Island of Tobago, from 1768 to
1775, inclusive. folio, pp. vii., 122, London, 1776.

- LVII. An Easy Introduction to the Arts and Sciences, &c., by R.
Turner, junr., L.C.D. 3rd edition, with considerable addi-
tions on Natural History, &c. Woodcuts.

12mo., London, 1791.

On the "Sugar Cane," page 185.

- LVIII. Jackson (Dr. Robert). Treatise on the Fevers of Jamaica,
with observations on the Intermittent Fever of America. 1791.

- LIX. Garan Coulon (J. Ph.) An Inquiry into the Causes of the
Insurrection of St. Domingo. London, 1792.

- LX. Port-au-Prince. Production Historique, Report des Gardes
Nationals. 4to. Port-au-Prince, 1792.

- LXI. The History, Civil and Commercial, of the British West Indies.
By Bryan Edwards, Esq.

1st edition, 2 vols. 4to., London, 1793.

Another ,, 2 vols. 8vo., Dublin, 1793.

2nd ,, 2 vols. London, 1794.

3rd ,, 3 vols. 8vo., ,, 1801.

4th ,, 3 vols. 8vo., ,, 1807.

*5th ,, 5 vols. 8vo. and 1 vol. 4to.

plates, London, 1819.

* This edition contains a History of St. Domingo, from the retreat
of the British troops in 1798 to the present time. (1819).

- LXII. A Narrative of the Operations of Captain Little's Detachment,
and of the Mahratta Army, commanded by Pierseeram Bhoy,

during the late Confederacy in India against Nawab Tippoo Sultan Bahada. By Edward Moor.

large 4to, London, 1794.

Note on page 441—"On the Cultivation of Indigo and Sugar in the Island of Salset."

LXIII. An Abridgement of Mr. Edwards' Civil and Commercial History of the British West Indies. Made by Thos. Taylor, the Platonist. 2 vols. 8vo. London, 1794.

LXIV. East India Sugar, Raw and Refined, Sold, Wholesale and Retail, by Joseph Leaper, No. 157, Bishopsgate without London. Endorsed—"Having recently imported a quantity of Maple Tree Sugar from Canada, offers it to the Public for Sale, being the first introduction of this Sugar on a commercial plan."

Folio, single leaf, circa 1794.

LXV. An Historical Survey of the French Colony on the Island of St. Domingo. By Bryan Edwards, Esq. Privately printed 4to. with Map, 1797.

*** Since incorporated in the author's History of the British West Indies.

The following belong to List given in August, 1884, "*Sugar Cane*," page 209:—

LXVI. Lyonnet (Le C.) Statistique dela Partie Espagnol de Saint Domingue. Paris, 1800.

LXVII. Public Acts in Force, passed by the Legislature of Barbados, from May 11, 1762, to April 8, 1800. By Samuel Moore. roy. 8vo., 1801.

LXVIII. Letters on the Cultivation of the Otaheite Cane; the Manufacture of Sugar and Rum, the Saving of Molasses, the Care and Preservation of Stock. . . . By Clement Caines, Esq. 8vo., pp. xv., 301, London, 1801.

LXIX. Breton (J. B. J. de la Martiniere). Histoire de l'Isle de Saint Domingo. 8vo. Paris, 1802.

LXX. Du Coeur Joly (S. G. ancien habitant de St. Domingo) Manuel des Habitans de St. Domingue. 2 vols. Paris, 1802.

LXXI. Letters and Papers on Agriculture, Planting, &c., from the correspondence of the Bath and West of England Society. Abridged. 2 vols., Bath, 1802.

*** On Saccharine quality of the Juice of Pears, at page 173; on Maple Sugar of America, by (Mr. Clifford), page 183.

LXXXII. History of the Maroons; from their Origin to the Establish-

- ment of their Chief Tribe at Sierra Leone; with a succinct History of the Island of Jamaica and its State for the last Ten Years. By R. C. Dallas. 2 vols. 8vo., London, 1803.
- LXXIII. Moseley (Dr. Benj.) Treatise on Tropical Diseases and on the Climate of the West Indies. London, 1803.
- LXXIV. Transactions of the Society instituted in London for the encouragement of Arts, Manufactures, and Commerce; with the premium offered for the year 1804. 8vo., London, 1804.
- * * Sugar. Premium for preparing from treacle, 50 guineas.
- LXXV. An Historical Account of the Black Empire of Hayti. By Marcus Ramford. 4to. London, 1805.
- LXXVI. Travels in Trinidad during the months of February, March, and April, 1803, in a Series of Letters addressed to a Member of the Imperial Parliament of Great Britain; illustrated with a Map of the Island. 8vo., pp. xvi., 354, Liverpool, 1805.
- LXXVII. Arithmetical Questions on a New plan. By Wm. Baker. 4th edition, 12mo. London, 1806.
- * * Article "Sugar." Numbers killed in cultivating sugar.

The following belong to Part II. (April, 1884, "*Sugar Cane*," page 211):—

- LXXVIII. A Letter to W. Manning, Esq., M.P., on the Propositions submitted to the consideration of Government for taking the duties on Muscovado Sugar *ad valorem*. By Charles Bosanquet. December 20, 1806. pp. 38, 12mo. 1806.
- LXXIX. Stedman (Captain J. G.) Narrative of a Five Years' Expedition against the Revolted Negroes of Surinam, in Guiana, on the Wild Coast of South America, from the year 1772 to 1777, elucidating the History of that Country, and describing its productions. . . Numerous Plates. 2 vols. 4to., 2nd edition, London, 1806.
- LXXX. Robin (C. C.) Voyage dans l'Interieur de la Louisianne, St. Domingo, &c. Paris, 1807.
- LXXXI. An Inquiry into the State of the British West Indies. By Joseph Lowe, Esq. pp. xx., 160, 12mo. London, 1807.
- LXXXII. The History of Barbados from the first Discovery of the Island in the year 1605 to the Accession of Lord Seaforth in 1801. By John Poyer. 4to., London, 1808.
- LXXXIII. A Letter to the Governors, Legislatures, and Proprietors of Plantations in the British West India Islands. By Beilby Porteous, D.D., Bishop of London. 8vo., pp. 48, London, 1808.

- LXXXIV. Hakluyt (Richard). Principal Navigations, Voyages, and Discoveries of the English Nation, reprinted from the rare edition of 1590, with addition selected and arranged by the Editor (G. Woodfall). 5 vols. roy. 4to. London, 1809-1812.
- LXXXV. Guillermin (M. Gilbert E.) Précis Historique des derniers Evenements de la Partie de l'est de St. Domingue depuis 1808. Paris, 1811.
- LXXXVI. Alcedos (Ant. de). Geographical and Historical Dictionary of America and the West Indies, translated from the Spanish, with large additions from modern Voyages and Travels and additional Information by G. A. Thompson, with an Atlas. 5 vols. 4to. London, 1812-1815.
- LXXXVII. Dalmas (M. Antonio). Histoire de la Revolution de Sain. Domingue, &c. Paris, 1814.
- LXXXVIII. A Memoir of the Conquest of Java. . . . To which is added a Statistical and Historical Sketch of Java, with an account of its Dependencies. By Major W. Thorn. 4to., London, 1815.

NEW YORK PRICES FOR SUGAR.

From Willett, Hamlin & Co.'s Report, April 16th, 1885.

FAIR REFINING—	96° CENTFS.	GRANULATED.	STAND. A.
April 16, 1885.—4 9-16c.	5½c.	5 15-16c.	5½c.
April 17, 1884.—5¾c.	6 5-16c.	7c.	6¾c.
April 19, 1883.—6 15-16c.	7¾c.	8¾c.	8¾c.
April 20, 1882.—7½c.	8 9-32c.	9¼c.	9½-8c.
April 21, 1881.—7¼c.	8½c.	9 7-16c.	9-9¼c.
April 15, 1880.—7¾c.	8 9-16c.	9¾c.	9-9¾c.
April 17, 1879.—6¾c.	7¼c.	8¾c.	7¾-8c.
April 18, 1878.—7¾c.	8 5-16c.	9¾c.	9-9¾c.
April 19, 1877.—9¼c.	9 15-16c.	11¼c.	11-11¾c.

Changes of the year compared with previous year, are :—

Stocks, 37737 tons more. Receipts, 32056 tons more. Distribution, 22605 tons more.

Prices : Fair Refining, 13-16c. lower. 95° Centrifugals, 1 1-16c. lower.

The above ton estimates (2240 lbs. per ton) are :—Hhds—

Foreign, 1450 to 2000 lbs. Boxes, 400 lbs. Bags, 60 to 250 lbs. Baskets, 500 lbs.

IMPORTS OF FOREIGN REFINED SUGAR.

The British Sugar Refiners' Committee furnish us with the following figures, giving the imports of foreign refined sugar for the month of March compared with the corresponding month of last year, and the average monthly imports for the past year compared with those of 1882 and 1883, distinguishing the quantities of "Lumps and Loaves" from "other sorts," and giving the separate imports from each country:—

	"LUMPS AND LOAVES."						"OTHER SORTS," Including Crushed Loaf, Granulated, Crystallized, &c.						TOTAL.					
	Monthly Average.			Mar.,			Monthly Average.			Mar.,			Monthly Average.			Mar.,		
	1882.	1883.	1884.	1885.	1884.	Tons.	1882.	1883.	1884.	1885.	1884.	Tons.	1882.	1883.	1884.	1885.	Tons.	1884.
	Tons.	Tons.	Tons.	Tons.	Tons.		Tons.	Tons.	Tons.	Tons.	Tons.		Tons.	Tons.	Tons.	Tons.	Tons.	
France	3638	3538	2737	2431	3656		1953	2477	1621	664	2055		5591	6015	4558	3095	5711	
Holland	1763	2352	3580	3778	3419		1522	1853	1948	1766	1650		3285	4205	5528	5544	5069	
Germany & Austria	513	588	552	978	387		948	1854	2380	3970	3559		1461	2442	2932	4948	3946	
Belgium	657	319	183	195	223		67	124	151	116	254		724	443	334	311	477	
United States	94	226	962	647	1822		101	294	3386	8883	976		195	520	4348	9530	2798	
Other Countries ..	..	..	..	7	..		269	61	121	..	1		269	61	121	7	1	
Total	6665	7023	8014	8036	9507		4860	6663	9607	15399	9495		11525	13686	17621	23435	18002	

SUGAR STATISTICS—GREAT BRITAIN.

TO APRIL 17TH, 1885 AND 1884. IN THOUSANDS OF TONS, TO
THE NEAREST THOUSAND.

	STOCKS.		DELIVERIES.		IMPORTS.	
	1885.	1884.	1885.	1884.	1885.	1884.
London	90	104	104	111	104	129
Liverpool ..	120	94	79	83	88	100
Bristol	5	6	17	15	17	15
Clyde	80	70	72	73	104	82
Total ..	295	274	272	282	313	326
	Increase..	21	Decrease ..	10	Decrease ..	13

SUGAR STATISTICS—UNITED STATES.

(From Messrs. Willett & Hamlin's Circular, New York.)

FOR THE FOUR PRINCIPAL PORTS. IN THOUSANDS OF TONS, TO THE
NEAREST THOUSAND. FOR MARCH, 1885 AND 1884.

	STOCKS.		DELIVERIES.		IMPORTS.	
	April 1st,		For March,		For March,	
	1885.	1884.	1885.	1884.	1885.	1884.
New York	75	65	81	67	103	86
Boston	23	20	14	25	19	33
Philadelphia....	4	4	17	14	18	16
Baltimore .....	..	1	..	..	..	..
Total.....	102	90	112	106	140	135
	Increase..	12	Increase..	6	Increase..	6
Total for the Year ..	..	..	271	260	284	290

In the case of Baltimore, where nothing is put down, it means that the Stock, Imports, and Deliveries, do not exceed 500 tons in each case.

STOCKS OF SUGAR IN THE CHIEF MARKETS OF EUROPE ON THE
28TH FEBRUARY, FOR THREE YEARS, IN THOUSANDS
OF TONS, TO THE NEAREST THOUSAND.

Great Britain.	France.	Holland	Germany (Zollverein)	Four other entrepôts.	TOTAL 1885.	TOTAL 1884.	TOTAL 1883.
286	241	49	279	39	894	751	599

CONSUMPTION OF SUGAR IN EUROPE FOR THREE YEARS, ENDING
28TH FEBRUARY, IN THOUSANDS OF TONS, TO
NEAREST THOUSAND.

Great Britain.	France.	Holland	Germany (Zollverein)	Four other entrepôts.	TOTAL 1885.	TOTAL 1884.	TOTAL 1883.
1127	449	51	379	313	2319	2258	2154

ESTIMATED CROP OF BEET ROOT SUGAR ON THE CONTINENT OF EUROPE,
FOR THE ENSUING SEASON, COMPARED WITH THE ACTUAL CROPS
OF THE THREE PREVIOUS SEASONS.

(From Licht's Monthly Circular.)

	1884-85.	1883-84.	1882-83.	1881-82.
	Tons.	Tons.	Tons.	Tons.
France.....	325,000	473,676	423,194	393,269
Germany(Zollverein).....	1,150,000	986,403	848,124	644,775
Austro-Hungary....	540,000	445,952	473,002	411,015
Russia and Poland ..	335,000	307,697	284,991	308,799
Belgium	90,000	106,586	82,723	73,136
Holland and other Countries.....	50,000	40,000	35,000	30,000
Total.....	2,490,000	2,360,314	2,147,034	1,860,994

Mr. Licht's present estimate exceeds that of last month by 20,000 tons. He has raised the figures for Austria by 15,000 tons, and for Belgium 5,000 tons.

STATE AND PROSPECTS OF THE ENGLISH SUGAR MARKET.

We have again to report an improved market for all kinds of raw sugars; prices are from 3d. to 6d. per cwt. above the highest point reached in March. 88 per cent. f.o.b is now 12s. 9d. per cwt. for prompt delivery, and 13s. per cwt. for May—an advance of $27\frac{1}{2}$ per cent. since 1st January.

This improvement is the more satisfactory, since it cannot be set down to outside speculation, but to the growing feeling of confidence in present values.

It is yet too early to speak with certainty as to the extent of the reduction in the next season's sowings on the Continent; that the reduction will be considerable, there is now, we think, but little room to doubt.

The shipments of raw beet sugar now being made to the United States favourably affect, for the time being, the prices of raws in this market, though it is quite possible that these same sugars may, by the operation of the United States bounty system, find their way back to this market in the refined state, and so enter into competition with the refiners here, and so lessen, to this extent, their purchases of raw sugars.

We are glad to notice that the American Government is turning its attention to their bounty system, by which their refiners receive a larger sum in drawbacks than has been received by the Government in duty.

It is singular to note, that by the aid of bounties, the Germans are able to ship their raw sugars to America, and that the refiners there can, by the aid of their bounties, re-ship it to this country in the refined state, and compete with our own refiners—a fact which is unique in the history of the sugar trade.

On the 17th April, 1885, the deliveries in the United Kingdom show a decrease of 10,027 tons as compared with the corresponding period of 1884, and the imports show a decrease also of 12,941 tons.

The imports of American refined for the three months ending March 31, 1885, amount to 15,732 tons, against 3,216 tons for the first three months of 1884.

The stocks in the United Kingdom on 17th April, 1884, amounted to 295,490 tons, against 274,114 tons in 1884, and 228,210 tons in 1883.

The present quotations for the standard qualities, as under, are :—


FLOATING.		Last Month.
Porto Rico, fair to good Refining	12/9 to 13/3	against 12/3 to 12/9.
Cuba Centrifugals, 96% polarization ...	14/3 to 14/6	„ 14/- to 14/3.
Cuba Muscovados, fair to good Refining ..	12/9 to 13/3	„ 12/3 to 12/9.
Bahia, middling to good Brown, No. 7 to 8½	10/6 to 12/-	„ 10/- to 11/6.
Pernambuco, good to fine Brown	12/6 to 12/9	„ 12/- to 12/3.
Java, No. 14	15/- to 15/3	„ 14/9 to 15/-.
LANDED.		Last Month.
Madras Cane Jaggery	9/3 to 9/6	against 9/- to 9/3.
Manilla Cebu and Ilo Ilo	9/3 to 9/6	„ 9/- to 9/3.
Paris Leaves, f.o.b.	17/3 to 17/9	„ 17/3 to 17/6.
Titlers	19/-	„ 18/-
Tate's Cubes	21/-	„ 20/-
Austrian-German Beetroot, 88% f.o.b. ..	12/9	„ 12/3

THE SUGAR CANE.

No. 191.

JUNE 1, 1885.

VOL. XVII.

 The writers alone are responsible for their statements.

N.B.—All communications to be addressed, and Cheques and P.O. Orders made payable to HENRY THORP, Ducie Chambers, 57, Market Street, Manchester.

For Scale of Charges for Advertisements, see page xi.

For Table of Contents, see opposite the last page of each Number.

ERRATA.—May *Sugar Cane*.

Page 226, 13 lines from bottom, for Anti-Bounty, *read* Ante-Bounty.

The Editor begs to intimate, that all papers, intended for *The Sugar Cane*, should be in his hands, to ensure insertion in the following number, not later than the 20th of each month.

Lord Derby has marked his appreciation of Mr. Thurston's services by appointing him Lieutenant-Governor of Fiji. Mr. Thurston's official connection with Fiji dates back from 1866.

Mr. W. P. B. Shephard has addressed a letter to the West India Committee in reply to their enquiry, "whether the terms of the project of a Convention for commercial reciprocity between the United States and the West Indies would contravene or be inconsistent with the British Navigation Laws;" which will be found at page 288.

A meeting of the council of the National Anti-Bounty League was held on the 12th May. The fierce opposition with which the proposal to tax beer and spirits was being met, seemed to present a favourable opportunity for urging upon our Government the desirability of imposing a duty upon all bounty-fed sugars, as a means of obtaining the required revenue. A short report of the meeting we give at page 286.

A Parliamentary return has just been issued, containing a copy of the correspondence on the sugar bounties, from 26th July to December 9th, 1884, to which is appended a very interesting and exhaustive report from Mr. Scott, the Secretary to the British

Embassy at Berlin, on the Bounties on Raw Sugars exported from Germany. At page 44 of the report is given the scale of drawbacks, showing that the difference between the actual and legal drawback upon 88% raw beet is about 11d. per cwt. This, no doubt, is what it *ought to be*; but, if we are not mistaken, it is only about one-third of what it actually *is*. In our next number we intend giving a more detailed notice of this carefully prepared report.

A Parliamentary return (Commercial No. 4, 1885) has also been printed, containing the correspondence respecting the negotiation of a Treaty regulating trade between the British West India Colonies and the United States. It also contains extracts from the Treaties between Great Britain and the United States of 1815, 1818, and 1827. At the end is a long letter from Earl Granville to Mr. West, dated February 12, 1885, setting forth the reasons which have led our Government to reject the counter-proposals of the United States' Government, and requesting a reconsideration of the original proposals.

On the 5th of May the City and Colonial Club, at 46, Basinghall-street, London, was opened, when Mr. Paul Joske gave some very interesting particulars of the trade and resources of Fiji. Sugar stands at the head of the list. In 1875 the exports of sugar did not reach 100 tons, in 1883 they increased to over 5000 tons, and for 1884 they will be about 10,000 tons. In 1883 the value of the exports of sugar was equal to the exports of all the other products put together. At page 303 we give the greater part of Mr. Joske's address.

As our readers know, we have never had any confidence in the ultimate success of sorghum growing in the United States, notwithstanding the very sanguine views upon it of Dr. Collier and others. In the *Sugar Cane* for March, 1884, page 129, we gave Dr. Collier's address on sorghum, to which we ventured to add the following, "If in three or four years' time we compare what is here predicted with the *facts* which will then be before us, we shall see to what an extent our American friends have been drawing upon their imagination. Our impression is that the amount of sugar then raised in the States will be less, in proportion to the consumption, than it is at this moment."

The facts are coming out sooner than we had expected. The following we take from the *Sugar Beet* (Philadelphia) just to hand:—

ANOTHER SORGHUM FACTORY SUSPENDED.

"It is with regret we learn of the suspension of the sorghum factory at Champagne, Illinois. While we have not confidence in the future of the so-called northern cane industry, we would have been, and still are, only too glad to give a helping hand to thousands who have lost money, and tens of thousands who will continue to squander their fortunes, if they persist in erecting factories for sugar extraction from sorghum."

We heartily congratulate Mr. E. F. im Thurn, M.A., the able Editor of The Journal of the Royal Agricultural and Commercial Society of British Guiana, upon his successful attempt to reach the summit of Mount Roraima, which was spoken of in the *Spectator* some eight years ago, as "one of the greatest marvels and mysteries of the earth." "According to the traditions of the Indians," says Sir Robert Schomburgk, in 1840, speaking of Roraima, "the summits of the flat-topped gigantic sandstone walls, which never can be reached by human beings, contain large lakes, full of remarkable fish-like dolphins, and encircled by gigantic white eagles—their eternal warders." The mountain is about 9000 feet in height, the last 2000 feet being a precipice up which it was supposed there was no possible access. At the last meeting of the Royal Geographical Society, some notes by Mr. Perkins, who accompanied Mr. im Thurn in the ascent, were read, giving some interesting details of this hitherto unexplored region in British Guiana.

In the House of Commons, May 8th, Mr. Stanhope asked the Under Secretary of State for Foreign Affairs whether the Belgian Government had recently proposed that a conference should be held on the subject of the sugar bounties; what answer had been given by Her Majesty's Government; and whether he could lay any papers upon the table on that subject.

Lord E. Fitzmaurice, in reply, said: An invitation to attend this proposed conference was conveyed to Her Majesty's Government in December last by the Belgian Minister. Baron Solvyns was informed, in reply, that in the opinion of Her Majesty's Government any active steps for the relief of the sugar industries must be taken by the countries whose duties and bounties have placed this industry in an artificial position. Her Majesty's Government, before accepting the invitation, wished to know whether the Governments of the countries which grant bounties had expressed their intention of being represented at the proposed conference. An answer was received shortly afterwards to the effect that the proposal was abandoned. I will consult the President of the Board of Trade as to the presentation of papers.

The following extract is from a letter dated Magdeburg, 9th May:—

“Regarding the next crop (beet), the fresh fact which has come to our knowledge about the reduction of sowings is the following:—Last year at this time the Thuringian railways (one of our largest root districts) had advised or engaged for transport 3,500,000 cwt. of roots, and this year but 500,000 cwt. have been engaged. We, in fact, maintain our estimate of 25 per cent. reduction. Licht-to-day speaks of 15 to 20 per cent.”

The following we take from the *Journal des Fabricants du Sucre* of May 20. It will be seen that in the opinion of that paper the reduction in the next European sugar crop is more likely to be above, than below, half a million of tons. If this should prove to be anywhere near correct, we may expect to see good refining West India sugars at 22s. before the year is out:—

The temperature of the week has been very unfavourable, and it is difficult to imagine weather less suitable to the season. It has frozen almost every night; during the day the thermometer has not exceeded 16° to 17° (41° to 41½° Fahr.), whilst it attained 28° to 29° (47½° to 48° Fahr.) last year. We see by comparison how cold the weather has been, and one may judge of the damage which vegetation—which is everywhere considerably behindhand—is suffering. In many localities insects are committing great ravages, and the sprouting, much behindhand, is very irregular. Re-sowings have already had to be made, an operation which produces very uncertain results, because of the cold. The arrival of warm weather might repair a portion of the evil which we record, but up to now there is no appearance of any change. At the outset of the season circumstances appeared admirably propitious, and the sprouting of the plants especially left nothing to be desired. But at present, to employ the popular expression, the beet is being eaten, which means either that the insects are devouring it, or that it is disappearing under the action of cold. Even oats, which in many places have replaced the beetroot, are destroyed, or very much thinned, by the insects. These circumstances are not of a nature to increase the production of sugar, which is already in a deficit by the reduction of sowings, amounting to 25 per cent. at the least. There are localities, at one time renowned for their sugar cultivation, where one sees no beets at all; and other places where they are talking of 40 to 50 per cent. less.

In Germany the weather is also excessively cold, and it has been impossible to continue the sowings, which are not finished; many re-sowings have had to be made. The sprouting is behindhand and irregular. The reduction of the surface devoted to the cultivation of the beetroot is confirmed; it will be, for Germany alone, 20 per cent., which is equal to 225,000 tons of sugar. In Austria, Belgium, Holland, the deficit is also considerable, and in estimating the reduction for the whole of Europe at 20 per cent. we shall be below rather than above the truth. The news from the principal Colonies is no better, and we may now affirm with certainty that the plethora of sugar is on the eve of ceasing.

THE RECENT RISE IN THE PRICE OF SUGAR.

The recent sharp advance in the price of sugar—in beet some 3s. 6d. cwt. in the month, or if we take the advance since 1st January last, it is equal to about 65 per cent.—gives rise to the enquiry, Will it be maintained? Is it not due to speculation? and, Will the trade respond to it?

Those who look only at the large stocks still on hand in Europe and in the United States, and who dwell upon the fact that high prices will check the increase in the consumption, will answer in the negative. Those, however, who look at the matter all round, will, we think, take a different view. Prices at the present time are only on a level with those of March last year; at that time the stocks in Europe were 153,000 tons in excess of what they were in March, 1883. The stocks are now, roughly speaking, in Europe, some 170,000 tons more than they were this time last year. A year ago we had the certainty of a large beet crop before us: now we have the certainty of a large deficit; the extent of the probable deficit is variously estimated—some put it down at 500,000 tons, others between this figure and 300,000 tons—we incline to take the lowest estimate. If we turn to the prospects of our cane supplies—there is nothing here which points to an increase upon those of last year. In Cuba the present prospects point to a crop of 500,000 tons, and the most sanguine estimates do not place it at more than last year. The probable deficit in the Brazil crop is spoken of as 20,000 tons, and in the Philippine Islands, 40,000 tons. The latest accounts from Louisiana are also unfavourable for the coming crop.

The increase in the consumption of sugar in Europe and the United States in 1884, as compared with 1883, was, in round numbers, 200,000 tons. In the United States it exceeded 100,000 tons. The increase in the present year may not, on account of the higher range of prices, show up so favourably, but it will be safe to put it down at 150,000 tons; which nearly wipes out the present surplus stock, and leaves us with 300,000 tons of a deficiency.

In 1876-7 there was a failure in the European beet crop; the result was, a deficit as compared with 1875-6 of 297,000 tons. Muscovado, which was quoted in July, 1876, at 20s., went up to 30s. before the end of the year. We cannot give the prices of raw beet at these two periods, there being none on offer.

Considerable though the advance has been in sugar since 1st January, the present prospects would seem to point to still higher prices even than those now ruling, before the year is out. For two years, the fall in values was so constant, that our refiners and grocers could scarcely buy right; the tables have at last turned, and for some months to come, at all events, they will scarcely be able to buy wrong.

NOTE.—In the February *Sugar Cane*, pages 106 and 107, we gave a weekly statement of comparative prices of raw and refined sugars for the years 1882, 1883, and 1884, which will be found very useful in drawing comparisons between present prices and those of any given week in these years.

THE SUGAR BOUNTIES AND THE BUDGET.

A meeting of the council of the National Anti-Bounty League was held on the 12th of May, and among those present were :— Mr. JAMES DUNCAN in the chair, Lieut.-Col. and Alderman Cowan, Mr. Nevile Lubbock, Mr. George Martineau, Mr. Garviller, Mr. W. M. Campbell, Mr. Ohlson, and the Honorary Secretaries, Mr. Forster M. Alleyne, and Mr. W. P. B. Shepheard.

After the minutes of the previous meeting had been read and confirmed, the CHAIRMAN (Mr. James Duncan) said the National Anti-Bounty League had entered on the fifth year of its existence. It had been inaugurated in September, 1880, for the purpose of promoting the abolition of all foreign export bounties. In this object they had met with considerable support. Amongst other bodies they had received large support from working men's associations having a similar object in view. Meetings had been held not only in London, but in Birmingham, Bristol, Liverpool, Leeds, Hull, Derby, Lincoln, Nottingham, and other large towns in England and Scotland; and everywhere their principles were favourably received, and their agitation successful. Of course their constitution confined them to the subject of foreign export bounties, and therefore they did not deal with such questions as "reciprocity" and "fair trade." On reviewing the situation, he thought that no better opportunity could be afforded them than the present of urging their claims on Parliament. The proposal of the Government to increase the taxes on beer and spirits was, they knew, meeting with fierce opposition; and it was therefore expedient to consider the propriety of urging on the Government a proposition to meet some of the increased taxation by the imposition of a duty on all bounty-fed sugar, and the honorary secretaries had prepared a draft memorial for the consideration of the council.

Mr. SHEPHEARD having read the draft memorial,

The CHAIRMAN proceeded to say that they all knew that the bounty system was increasing instead of decreasing. In the months of January, February, March, and April, nearly 30,000 tons of refined sugar had been sent to this country from America, and that had had a most depressing effect on the price of sugar. At the present time refined sugar was from 2s. to 3s. under the price of last year, when the price of raw sugar was very nearly the same as at the present time.

Well, as he had said, he thought this was a fitting moment to resume their agitation, particularly as the Government had put themselves outside their professed free trade principle by their proposal with regard to wines. They make a special exception in that case, and he did not see why they should not do something also with regard to sugar. He thought the League should combine with the other bodies who were agitating, with the object of getting the Government to alter their Budget.

Mr. NEVILLE LUBBOCK agreed with the Chairman that this was a favourable moment for resuming their agitation. Particularly he thought it was so in the interest of the West Indies. He had been asked before the Parliamentary Committee what effect, he thought, the continuance of the bounties, if unopposed by our legislation, would have on the West Indies. His reply then was that it would lead to an agitation for annexation to the United States. That had come to pass. After having read passages from the report of a meeting held in Barbados, at which very strong language was used in the direction of annexation to the United States Mr. Lubbock proceeded to say the reason of all this dangerous disaffection was that the West Indies justly complained that their produce was driven out of the English markets by these foreign bounties. He argued that the Government had gone very much out of the principle of free trade on this bounty question, and what the League wanted was a restoration of the principle of free trade. He thought they might fairly ask the Government to restore them to the position in which they would stand if they had free trade on the Home market. There was, he thought, reason to hope that if the matter was properly brought forward they might get an opportunity of having the question discussed again. It could not be denied that a great revolution had taken place in public opinion on the subject. The public were now beginning to see that these bounties were contrary to free trade, and there existed now a much stronger desire to see them abolished than was the case some years ago.

After some discussion, resolutions in favour of a portion of the increased national expenditure being met by the imposition of such duties as would intercept foreign export bounties for British revenue, and authorising the honorary secretaries to forward the draft memorial for the consideration of the West India, Refiners, and Workmen's Committees, were unanimously agreed upon.

CONVENTION AS TO TRADE BETWEEN BRITISH WEST INDIES AND UNITED STATES.

In reply to an inquiry from the West India Committee, the following letter has been received by the Committee from Mr. W. P. B. Shephard, of Lincoln's Inn :—

24, Old Buildings, Lincoln's Inn, W.C., March 27, 1885.

NEVILLE LUBBOCK, Esq., &c., Chairman West India Committee.

Dear Sir,—In reply to the letter of the 18th instant from the Secretary of the West India Committee, inquiring whether the terms of the project of a Convention for commercial reciprocity between the United States and Her Majesty's possessions in the West Indies and South America would contravene or be inconsistent with the British Navigation Laws, I beg to state that, upon examination of the Imperial Acts relating to our mercantile marine and our Colonial marine and coasting trade, I cannot find any statutory enactment which would preclude Her Majesty from entering into the projected Convention.

I have perused the Convention carefully, and although it is, to my mind, somewhat inartistically worded, and in that respect capable of improvement, yet the purport of the Convention is perfectly clear from the various articles therein.

The object of the Convention is to facilitate commercial intercourse between the British West Indies and British Guiana on the one side, and the United States of America on the other, by reciprocal remission of duties on certain scheduled articles in which remission of duties by the West Indies and British Guiana, the mother country, and all other British Colonies are unconditionally to share, and also all foreign States which give to the West Indies the equivalent of the terms conceded by the United States. The Convention also places British and American shipping engaged in the inter-Colonial and coasting trades on the same terms. It also provides reciprocal most-favoured-nation treatment between our West Indian and South American possessions on the one side, and the United States on the other, thus terminating, so far as the West Indies and British Guiana are concerned, the injurious effect of the exclusion of British Colonies from most-favoured-nation treatment, as provided by the terms of our present existing commercial treaty with the United States.

It is impossible within the limits of a letter to enter fully into all legal details, but I have no hesitation in saying that our Mercantile Marine and Customs' Acts reserve to the Crown what may be shortly termed reciprocity power, and also to Colonial Legislatures powers to

be exercised under the approval of the Crown, as regards any provisions in our Merchant Shipping Acts relating to ships registered in the Colonies. But, as regards the present projected Convention, it seems to me that any possible questions are met by Article XIII., which gives full liberty to the British Government as regards their existing treaty engagements, and to the United States full power to denounce the Convention if any valid claims of foreign States to share the benefits of the Convention without equivalent concessions should by reason of such existing treaty obligations have to be recognised by Her Majesty's Government.

It might be suggested that the Reciprocity Treaty of 1854 as regards Canadian and American trade is a precedent for the proposed Convention. That treaty, however, contained no navigation articles except as regards inland lakes and rivers, or articles reserving privileges to contracting Powers; yet under it Canada levied a differential tariff in favour of the United States as against even the mother country and the British Colonies. Such differential tariff existed, I believe, only in two articles; but in one of these, whilst free of duty from the United States whilst the Reciprocity Treaty was in force, a duty of 20 per cent. was kept on by the general tariff when imported from all other places. This Reciprocity Treaty was terminated by the United States in 1866.

The draft of another projected Convention between Great Britain and the United States as to the American and Canadian trade was approved in 1874 by the Earl of Derby, then at the Foreign Office, although such draft Convention provided a differential tariff favouring imports of a large class of articles into the respective territories of Canada and America.

In conclusion, it does not appear to me that any differential treatment in favour of British shipping at the hands of the United States Government could properly raise any question of principle under our own Navigation Laws. Of course, so far as such treatment is the immediate consequence of concessions favouring American trade and shipping, with which by the terms of the Convention in the ports of the West Indies British trade and shipping must be equal, those concessions may be said to bear on the question of principle involved in our Navigation Acts; but I can find no statutory enactment which would require the Crown to construe the favoured nation article as giving identical treatment to any two or more nations which do not concede identical equivalents for our most-favoured-nation treatment.

I remain, dear Sir, yours truly,

WALLWYN FOYER B. SHEPHEARD.

MR. WILLIAM RUSSELL ON CANE v. BEET.

In the April *Sugar Cane* we gave Mr. Russell's "Reflections" "on the relative positions of Beet Sugar and Cane Sugar as produced respectively for refining purposes in Germany and Demerara." Some of the statements advanced by Mr. Russell have been the subject of controversy in the Demerara press, and has called forth the following reply from Mr. Russell, addressed to the *Demerara Argosy* :—

Dear Sir,—My attention has been called to a letter headed *Cane v. Beet*, written by "Chemist," in the *Argosy* of 28th March. Had your correspondent read the report of Mr. Francis our respected Colonial Analytical Chemist on the analysis of trial plots of canes grown in the Botanical Gardens, and the very elaborate researches of Mr. Alexander on the trial plots at Anna Regina, he would not have found it necessary to put question No. 1. My answer to question No. 2., I shall put in a practical form :—

I have for years past purchased the canes from the villagers of Beterverwagting and up to the time I left the colony the price was 3 dols. per 100 gallons juice polarizing 100° Soleil = 1.635 pounds of sugar per gallon of 10.7 pounds avoirdupois. The sudden drop in the price of both sugar and rum caused my representatives to recast this price, and the new price was fixed at 1 dol. 75 cents. per 100 gallons.

On my return to the colony I investigated the correctness of the price paid, and the following is the result of my investigations :—The mills on La Bonne Intention have been improved by the addition of Stewart's hydraulic setting to the journals of the second mill, with the result that when grinding canes carrying 12 per cent. fibre and the megass is softened by steaming between mills, the expression has risen to 71 per cent. of juice ; but when grinding the hard dry canes of the farmers, the expression has dropped to 68 per cent. which is still good work. There is no scum, all the residue is passed through a battery of Kroog's filter presses, the result being dry scum cake. Sixty eight per cent. of a ton of canes the specific gravity at 10.7 amounts to 142 gallons, which at the new price per gallon gives 2 dols. 48 cents. per ton of canes to the farmer. The total sugar in the juice of a certain lot was 232 lbs., of which 72 per cent. or

167 lbs. was in refining crystals. Dividing 2240 lbs. (or one ton) by the 167 lbs., the result will show that 13·5 tons canes go to the ton of sugar.

Thus I paid for 13·5 tons canes at \$2 48\$33 48

Cost of manufacture including proportion of manage-
ment, Immigration, tear and wear of machinery,
and all charges up to delivery in Georgetown.....\$27 00

Total cost\$60 48

Cr. 67 gallons molasses at 10c. 6 70

53 78

Dividing this by 22·4 the product is \$2 40 per 100 lbs. Anything obtained over this is interest on capital. This is for refining sugar delivered in Georgetown, analysing 94° net. Unless my manager recovered 72 per cent. of the sugar in the cane juice, I paid too much for the raw material.

The besetting sin of colonists from highest to lowest is to procrastinate, to “*put off*” or “*hang up*”; and I felt that when I was committing my German experiences to paper, many friends would condemn me for carrying my investigations so deep, and laying open our weakness. To be forewarned is to be forearmed, and while I know that I have a formidable adversary in my path it is not causing me to despair. It is unquestionably a sad sight to see so many broad acres thrown out of cultivation to go back into jungle. Still, unless land will yield a return of cane juice to sell to a factory at \$1 75 per 100 gallons, it is more profitable in jungle than in sugar grass. Happily there are many acres in B. Guiana that can be worked at this price, and although our sugar crop may drop to very small proportions, yet—think of the grand future, opening up for the happy and contented peasant proprietors, regarding whom our worthy Governor entertains such bright hopes in the near future!

For the information of your “Chemist” correspondent I beg to submit the following analysis made by Mr. Alexander of Pln. Tuschen of a fair sample of canes taken from the cane carrier of that estate at the end of last month as showing that the present drought is quite as formidable an opponent as the beet root:—

	Per cent.		Per cent. by volume.
Sucrose	10·36	Sucrose	13·29
Glucose	2·78	Glucose	3·57
Fibre	16·00	Soluble Ash	·53
Soluble Ash	·43	Insoluble Ash	·28
Insoluble Ash	·32	Organic Matter ..	·70
Organic Matter ..	·56	Water	81·63
Water	69·55		
			100·00
	100·00		
		Specific Gravity ..	1077

The accompanying letter addressed to the *Glasgow Herald*, although differing slightly in details, in the main agrees with the conclusions I arrived at in *re Beet v. Canes*.

Your obedient servant,

WILLIAM RUSSELL.

Pln. Leonora, April 9, 1884.

Sir,—With reference to the article which appeared in your paper of the 27th ult., on the beetroot sugar question, I shall feel much obliged if you will insert the enclosed letter on the same subject, which I received a few days ago from a well-informed correspondent in London.—Yours, &c.,

R.

Greenock, Feb. 26th, 1885.

"I have delayed replying to yours of the 28th ult., in order that I might complete some inquiries I had set on foot as to the cost of beet sugar production in Germany. I am inclined to believe the following to be facts—i.e., to represent a fair average condition of the elements of cost in ordinary years:—

"1st. Roots cannot be grown with even the slightest profit under 90 pfgs. = 18s. per ton, delivered at factory, the pulp being returned free to the farmer.

"2nd. That even the best factories cannot work—pay wear and tear and 5 per cent. on capital—under 10s. per ton of roots worked.

"3rd. Taking an average of the last five years, it requires, in districts of average fertility, 10·33 cwt. of roots to make 1 cwt. of sugar of 95·5 polarisation = say 89·5 net analysis. In this calculation after-products and molasses are reduced to the standard of 95·5, and included in the weight.

"Now let us calculate on this basis:—

	£	s.	d.
Roots cost	18s.	per ton.	
Working expenses	10s.	"	
Therefore 10·33 cwt. of roots and expenses =	0	14	6
Root duty, 10·33 by 80 pfgs.	8	26	
Drawback, 1 cwt.	9	0	

Gain or bounty on export 74 pfg. = 0 0 9

Deduct 1½ degree at 3d., calculation being 1 cwt. at 89½

Cost of 88% delivered loose on factory floor 0 13 4½

Add—For discounts and loss of interest,

Bags,	}	... 0 1 6
Transit to Hamburg,		
Six months' loss of interest on drawbacks,		
Shipping expenses,		
Insurance,		
Two months' interest at 5%,		

Cost price on English conditions, f.o.b. Hamburg .. 0 14 10½

"In reference to the cost of roots, I may say that in the Dantzic districts, where rents are low, roots can be grown 10 pfgs. to 15 pfgs. per ton below the price calculated, but then there are some disadvantages also in those districts, and owing to the position of the factories the whole production has to be sold for export, and the fabricant gets a lower price for his sugar f.o.b. Dantzic than f.o.b. Hamburg. Some factories work below 10s. per ton of roots, but the average is right. The yield of 1 cwt. of sugar from 10·33 cwt. of roots must not be taken as applying to this year or to the

most fortunate fabricants. A yield of 1 cwt. from 8.34 cwt. of roots has not been uncommon, but the past two years have been of such an exceptional character both as regards weight of roots and richness that it would be unfair and imprudent to reckon on their repetition. By the employment of the villmorin seed and high manuring, yields of 14 per cent. to 15 per cent. have been reached, but always with a diminution of weight per acre and at a heavy expense. At present prices there is not a sufficient premium to pay for this 'forcing' of richness. Many competent agriculturists and fabricants consider that, counting the cost, it is more profitable to cultivate the kinds giving a large yield per acre and a moderate richness. I think that cultivators who are not *fabricants* (about 20 per cent. of the whole in Germany, about 30 per cent. in Austria, and about 50 per cent. in France and Belgium) will not sow beet unless they can make contracts for roots at above the prices offered by *fabricants*, and I think the latter won't see their way to bid higher, and will not be sorry to see less sown. If the bills now being discussed in Germany and France become law promptly, then I feel certain that the average diminution of sowings will be 25 per cent. Another point to be considered is that farmers generally in Germany and Austria have not done well lately. They are in many cases economising their labour and manure expenses—just letting the land produce what it will by its unexhausted fertility. This I hear from several people who supply the German farmer with manure. The result will surely be that the yield per acre, and possibly the richness will fall below average, instead of being as it has been for two seasons past, above average.—Yours, &c.

"H."

RHEA-RAMIE (CHINA GRASS).

A meeting of merchants and others was held on May 8th, at the Old Town Hall, Manchester, to consider a scheme propounded by Mr. E. Casper, of London, for the production and supply of rhea-ramie. Mr. J. F. Hutton, President of the Manchester Chamber of Commerce, presided. He said he had been much interested in the statements made as to the easy, rapid, and cheap manner in which this material could be grown and prepared for spinning and manufacture. It seemed to him extremely important, unless we would be thoroughly eclipsed by foreign competitors, that this country should take advantage of every opportunity that presented itself for extending and improving our trade. Mr. Casper (after reading letters of apology for non-attendance from Sir Joseph C. Lee and Mr. John Slagg, M.P.,) gave a detailed explanation of the means by which rhea grass can be grown and prepared for manufacture. Specimens of the grass in its raw and manufactured condition were shown and excited considerable interest. A large tract of land is said to have been secured in Johore, where the grass can be grown under most favourable conditions. The hotter the climate the more frequently are crops yielded—provided there is water in sufficient quantity,—so that there is, in Mr. Casper's opinion, practically no limit to production; and, by processes which have been patented, the difficulties of preparing the grass for manufacturing purposes have been overcome.

Mr. R. D. Rusden, George Street, Manchester, who has taken a great interest in this matter, will be glad to furnish, upon application, fuller details to any wishing for them.

NEW ZEALAND IMPORTS OF REFINED SUGAR.

COMMUNICATED.

United States Consul Griffen, of Auckland, New Zealand, under the date of November 20th, 1884, has forwarded a very exhaustive report of the condition of the sugar trade in that colony. The quantity of refined sugar imported into New Zealand in 1883 was 19,819 tons, valued at 3,022,305 dols., against 15,252 tons, valued at 2,350,471 dols., for 1882. The value of the imports of raw sugar for the same time was 84,575 and 59,980 respectively. The following table gives the quantity and value of the imports of refined by countries for 1883:—

	Tons.		Value.
United Kingdom	148	....	\$25,140
Queensland	379	....	33,700
New South Wales	2,803	....	445,835
Victoria	5,000	....	841,285
Tasmania	993	....	17,840
Mauritius	11,189	....	1,649,120
Hong-Kong	1	....	175
United States	64	....	9,760
New Caledonia	3	....	445
Total (including cwts. not given) ..	19,819		\$3,023,300

The Consul, in speaking of the New Zealand sugar refinery works, says that capitalists in the colony were stimulated by similar enterprises in Victoria, New South Wales, and Queensland, and undertook to provide facilities for refining sugar at home. A bonus was offered by the Government, and while efforts were made to secure it by other cities, Auckland was the successful competitor. A company was formed in the early part of 1882, and the refinery was commenced in January, 1883, and rapidly pushed forward. It was opened for inspection on August 30th the same year. The refinery proper is 90 feet long and 60 width, and has two sides of brick and two of iron. The buildings are all covered with a galvanized iron roof. The main building contains the blow-up pans, bag-filters, bag washing tanks, vacuum pans, heaters, vacuum engines, centrifugals, and a steam railway, &c. The chain department is entirely of heavy brick, and is 90 feet high and 60 feet square. It contains twenty large cast-iron

cylinders, 30 feet in circumference, with a depth of 18 feet. Each cylinder when filled with water or liquid weighs 50 tons. The char-kiln house is of brick and iron, 60 feet by 40 feet. It has eight kilns, and the char filters weigh 300 tons. The capacity is 600 tons of refined sugar a week. Each vacuum pan contains 400 feet of solid drawn copper coils, and produces at every skipping seven tons of dry sugar. There are two air pumping engines, one large diagonal engine for centrifugals, one large one for ejecting water into pans, one Sir Wm. Armstrong's hydraulic engine and accumulator, and one vertical engine for liquours and water. The steam, after actuating the engines, is used for all the cleansing and boiling work of the refinery. Outside of the refinery there are five boilers, a number of patent fuel economisers, a chimney stack 126 feet high, with an internal diameter of seven feet, and several retorts for making animal charcoal and gas to light the works. There is also a workshop, with laths, planing machines, drilling machines, driven by a Tangye engine and boiler. The machinery was made by Mirrless, Watson & Co., of Glasgow; Blake, Barclay & Co., and McClean, Angus & Co., Greenock. The boilers were furnished by Jos. Clayton, of Preston, England, and the engines by Tangye Bros. The timber used in the buildings is all from Auckland, and cost \$40,000. The works are well supplied with water. There are two wharfs, each 211 feet in length, with an outward jetty of 330 feet. The shipping wharf is supplied with a long hydraulic crane, capable of discharging 200 tons per day. The bonded warehouse is capable of storing 10,000 tons of sugar, 6000 tons are now stored in it. The various floors of the refineries are well supplied with elevators.

In the same despatch the Consul speaks of the developments of the sugar industry in Fiji. The various mills are mentioned, including the Colonial Refining Company, of Sydney, and the New Zealand Co. One, on the Rewa River, belongs to the Rewa Sugar Refining Company, and another on the Nauva, the property of Stanlake, Lee & Co. The Pioneer Mill, on the island of Mango, just completed by Mr. Leicester Smith, is another large establishment, and there is still another large mill belonging to Billyard Brothers, at Taviuna. These mills are located either on or near the sugar plantations. This appears to be absolutely necessary, for, if the crushing power were not close at hand, fermentation would set in soon after the cane was cut and destroy it. The soil of Fiji is so well adapted to the growth

of the cane that many other mills, it is said, will shortly be established. Land, which now sells at 25 dols. an acre, would bring from 75 dols. to 100 dols. an acre if crushing power in the vicinity were available.

Mr. Thomson Leys, who has recently visited Fiji, and to whom I am indebted for much of the material of this report, is of the opinion that Fiji will develop in the near future the largest sugar industry in the southern hemisphere. This industry is one that requires a vast outlay of capital. Some idea of the extent of the operations of the various companies in Fiji may be formed from the following statistics in reference to the Colonial Sugar Company, the first ever established there. This company, during last season, employed 1748 men, of whom 165 were Europeans, 895 coolies, 560 Polynesians, and 198 Fijians. During the crushing season, from May to December, two steam-tugs, four steam-launches, and forty iron punts, capable of carrying from 50 to 100 tons each, were continually employed, and 40 additional punts have been constructed for this season's work. The mill has also been increased from a capacity of 50 tons per day to 100 tons.

Governor De Vœux, of Fiji, not long since expressed the opinion that the depression in the sugar market of the world was a sign of overproduction. His fears, I think, are groundless. The United States consumes fully one-fourth of all the sugar product of the world, and the demand for it increases in proportion to the reduction in price.

In 1883 there were 120 sugar mills in operation in Queensland; 16,952 acres of cane crushed producing 16,600 tons of sugar. This year 450,000 acres have been taken up in the northern part of that colony for tropical agriculture, chiefly for sugar growing. The consumption of sugar in New Zealand is increasing at a rapid pace, and the Auckland Sugar Refining Company, with a capital of £300,000, so far is fairly prosperous.

THE IMPORTATION OF SUGAR IN SWITZERLAND.

	1880. Tons.	1881. Tons.	1882. Tons.	1883. Tons.	1884. Tons.
From Germany	9343 ..	13404 ..	14893 ..	14844 ..	24409
„ France	9043 ..	7207 ..	7076 ..	8108 ..	8285
„ Austria Hungary ..	5373 ..	4865 ..	5317 ..	5685 ..	3320
„ Italy	1652 ..	1504 ..	1482 ..	1282 ..	803
	25410	26980	28768	29519	36817

The French sugar imported into Switzerland comes from the Paris refineries and is principally consumed in the French Cantons.—From the *Magdeburger Zeitung*.

SUGAR AS A FOOD FOR STOCK.

By Sir J. B. LAWES, Bart., LL.D., F.R.S.

[The low prices at which sugars have now for some time been selling have caused some attention being given to its use for feeding cattle.

The following valuable article, which we take from the *Journal of the Royal Agricultural Society of England*, by Sir J. B. Lawes, will be read with considerable interest. It will be seen that the opinion arrived at by Sir J. B. Lawes is, that sugar is not an economical substance to use, even at its present low price, when compared with other foods which are available to the farmer.

We have before us a work printed in 1809, entitled "Facts and Experiments on the Use of Feeding Cattle." It is anonymously written, and dedicated to Sir John Sinclair, Bart. The concluding paragraph of the book is as follows:—

"Such are a few of the properties of sugar, so long known to us only as an article of domestic use, and which has been a burden to our trade, from ignorance of its valuable qualities. We little knew, when our warehouses were groaning under its bulk, that we were in possession of one of the greatest blessings Providence ever bestowed on the world, and that, in place of looking abroad for consumption, we have a market for it at home, very much to the national benefit. We can convert it into beef, mutton, veal, pork, poultry, butter, cheese, milk, grain, and vegetables; by its use we can increase our necessities, our comforts, and our luxuries. Let but the enlightened policy of a wise Government remit the duty on what shall be consumed in agricultural purposes, and I make no doubt it will be felt as a real blessing by every man in Great Britain."

The average price of sugar at this period was about 75s. per cwt. (including the duty, which was 26s. per cwt.)—ED. S. C.]

The very low price of sugar at the present moment has naturally attracted the attention of agriculturists, and such being the case, it is certainly desirable, and at the same time may be useful, that its feeding properties should be more generally known. In a Liverpool price current I find the following quotation, "Refined sugar continues in fair demand for cattle feeding at £10 15s. to £11 5s. per ton.

It is now exactly thirty years since I read a paper before the British Association for the Advancement of Science on the equivalence of starch and sugar in food. At the period to which I am alluding

there was a considerable duty upon sugar, and one object of the experiments was to ascertain whether its feeding properties were sufficiently great to justify the farmer in making large use of the duty-free (? duty-paid) sugar.

The experiments were carried out upon pigs, which were fattened with starch and sugar, mixed with limited quantities of other foods. Before referring to the results obtained, I propose to make a few observations on food in relation to man and animals. If we compare the size of the stomach of a man with that of the domestic animals, it will be found that the former requires a comparatively concentrated food, and that there is not the space, nor does man possess what may be described as the necessary machinery, for extracting the food element from a large amount of indigestible matter. At Rothamsted I find that my cows consume about 100lbs. of solid (not dry) food daily. The weight of nine men would be about equal to that of one cow; one man would therefore have to eat 11lbs. of solid food daily in order to consume as much as a cow. There is no better food for an ox or a sheep than a first-class pasture, and yet a man could not support life upon grass. It might be possible by some chemical process to produce from grass a nutritious substance which a man could use as food, but the food so extracted would be far more costly than as it existed in the grass, and no one would think of preparing such a food for oxen or sheep, as their machinery is quite competent to separate the nutritious from the indigestible portion of the food.

A farmer who feeds stock for profit should exercise a considerable amount of judgment, as well as caution in the selection of their food. He should bear in mind that all processes of manufacture increase the cost of a food. Look, for example, at the extraordinary amount of mechanical and chemical skill which has been brought to bear upon the grain of wheat in order to produce a loaf of bread. A little coarse grinding, or even a few hours soaking in water, is all that is necessary to adapt the wheat to the requirements of the animal stomach. It is true that we purchase the bran and pollard for our stock, but it is as waste products; we do not pay the cost of their manufacture, and if there was no sale for these products they would have to be thrown away. In a similar way—as I pointed out many years ago—linseed, cotton, and rape cakes are waste products; they would be manufactured just the same whether farmers purchased them or not, and the

price at which they are sold is neither more nor less than what the competition between farmer and farmer enables the maker to obtain.

Linseed must be a cheaper food for stock than the oil and the cake manufactured out of linseed, assuming they were used together as a food; and unless the maker could find a sale for his oil for other purposes than as food for stock, his business would come to an end. In all questions, therefore, relating to the economy of food, it is most important to distinguish between a food which is the residue of some manufacturing process, and one which is manufactured as a food only. The process of manufacture, while it adds to the cost of the material, does not necessarily add to its feeding properties.

If sugar and sugar-beet were both foods which could be purchased in the market, there could be very little doubt regarding the greater economy of the beet as a food for stock, for a certain amount of loss in the sugar takes place in the process of manufacture, and the cost of the manufacture must also be paid.

With the exception of locust beans, there is no cattle food in the market which contains any large proportion of sugar, while almost the whole of the substances with which sugar, as a food, must come into competition, contain large quantities of starch; and, in consequence, the inquiry referred to was directed almost exclusively to the relative value of sugar as a food compared with starch.

Here I may mention, that however valuable both starch and sugar may be as foods, neither one nor the other could sustain life if used alone. It is necessary therefore, in the case of experiments carried out for the purpose of testing their food value, to use some substance which supplies the ingredients in which the starch and sugar are deficient. Lentils and bran, in relation to the starch which they contain, are very rich in the nitrogenous element of food; these two substances were therefore selected for use in the experiments with the starch and sugar. I also selected pigs as more suitable animals than oxen or sheep, from the fact of their having a wonderful power of increase, if furnished with plenty of good food. When fed with barley meal—which I might call the natural diet of civilised pigs—they will increase in weight by about 1lb. to each 4lbs. or 5lbs. of meal.

Having thus selected the pigs as the most suitable animals, and lentils and bran as the most suitable foods to be used with the sugar and starch, the experiments were arranged as follows:—

It is hardly necessary for me to make any further quotation from

these experiments. I would, however, point out that in Pen 4, where the pigs could select from the four foods what they liked the best, they took very little starch or bran, and almost confined themselves to lentils and sugar. This diet, though it pleased their palates, could produce but little more increase upon their weight than the starch, and what little there was is clearly due, not to the selection of sugar rather than starch, but to the rejection of the bran. Starch and sugar therefore, as foods, appear to be equivalent; or, in other words, a pound of one, properly used, can produce no more increase in our stock than a pound of the other.

If we turn from experiment to practice, it will be found that sugar does not possess the high feeding value which is sometimes attributed to it. The greater portion of the dry substance of mangolds consists of sugar. At the Liverpool quotation the sugar alone in mangolds would make their feeding value 17s. per ton, which is a far higher estimate than most farmers would like to place upon them. Swedes are generally considered quite as good a food as mangolds, if not better, weight for weight; and yet swedes contain less sugar than mangolds, and their consuming value is rarely estimated at more than 7s. or 8s. per ton. Sugar beet contains about 12 per cent. of sugar, which, at 11s. per cwt., would make the sugar in a ton of beet worth 27s., and yet some farmers in Suffolk were willing to sell their beet to the Lavenham Sugar Factory at 21s. per ton; and this, though the beetroots—in addition to the sugar—contained other valuable substances, such as nitrogen, potash, and phosphates.

Granted that a somewhat exaggerated value has been placed on sugar as a food for stock, still there is no doubt that it is an excellent food: the only question therefore is this, At what price should a farmer buy sugar as compared with other foods in the market?

Although we may not know what is the most healthy balance of the various constituents of food to be given to our stock in their various stages of growth and fattening, still there are certain limits beyond which we may feel sure that food will be wasted. The pigs in my experiments, which were allowed to select what they pleased out of the four foods—lentils, bran, sugar, and starch—consumed more of the highly nitrogenous lentils than the quantity which had been allotted to the pigs in the other experiments.

The relation of the nitrogenous to the non-nitrogenous food in this experiment was higher than it is in barley. I think, therefore, we

may safely conclude that sugar should not be used in any quantity with the cereal grains, or with maize, rice, roots, or even with meadow hay. All these substances are somewhat low in nitrogen, and to dilute the nitrogen that exists still more by the use of sugar would tend to waste it. On the other hand, the leguminous seeds, especially lentils, tares, and beans, and such foods as linseed-cake, cotton-cake, and clover-hay, contain a relatively large amount of nitrogenous substance, which might be safely diluted with sugar.

In comparing the value of sugar with that of other foods in the market, it is somewhat difficult to arrive at their actual composition; for instance, I found that the starch used in the Rothamsted experiments contained 20 per cent. of water, while the sugar only contained 3 per cent. Generally speaking, the ordinary dry foods in the market contain about 14 per cent. of water, and for practical purposes the deduction of one-seventh of the weight would be sufficiently accurate. The present price of lentils in the market is £5 15s. per ton, and beans may be purchased at about the same price. Assuming that sugar and beans, or sugar and lentils, were used in the proportion of one of sugar to two of the other foods, the mixture would cost about £7 per ton. When ordinary barley can be purchased at £4 10s. per ton, and Rangoon rice-meal at £3 to £4 per ton, it would appear that sugar is too dear to compete with starchy foods at their present extremely low prices.

There is another point in regard to the use of sugar which is somewhat important. I refer to the attractive character of the substance amongst all those who work on the farm. To ensure the animals their full modicum, it would require the eye of the master to be very close to his stock when their food was given to them.

In the case of animals which are off their feed, or to induce animals to eat their food which they would otherwise reject, sugar may probably be useful, but in such cases every one must use his own judgment. As a food for healthy stock, even at its present low price, sugar does not appear to be an economical substance to use when brought into comparison with other foods which are available to the farmer.

THE RESOURCES OF FIJI.

SOME INTERESTING PARTICULARS OF THE TRADE AND WEALTH OF
FIJI, BY ONE OF THE EARLIEST SETTLERS.

The City and Colonial Club was formally opened on May 5th, at 46, Basinghall Street, E.C., when a paper on Fiji was read by Mr. Paul Joske, one of the earliest settlers at Suva. The object of the club is to provide business men—either enjoying a temporary return to the mother country, or visiting London for the purposes of business—special facilities in the centre of trading operations.

Mr. J. E. BINGHAM, the Master Cutler of Sheffield, presided.

Mr. JOSKE said:—I have been requested by several gentlemen interested in colonial enterprise to lay before you a few facts gathered from my own experience while living in Fiji. It is true that my humble testimony to the wealth and resources of this, the latest colonial acquisition of the British Empire, is not of any great value; but such as it is, it is at your service. I have been a resident in the colony about 14 or 15 years. Fiji has many remarkable claims upon Englishmen, but comparatively little is known of its climate, its attractions, and its resources. It has been but imperfectly represented, and sometimes represented with an amusing disregard of precise description. Thus, a few years ago, a Member of the Legislative Council visited the North of Scotland, and gave a lecture, describing the colony as a group of islands surrounded by water. There are about 255 of these islands and islets in the Archipelago, and nearly 100 of them are inhabited. It is estimated that the inhabited islands cover 7740 square miles, and the whole group 8034 square miles. It is one of the latest territories annexed to the Crown of Great Britain, and it is to this day a Crown colony of a severe type, the Government being autocratic. Fiji first became known to the civilised world through the distinguished Dutch navigator, Captain Abel Jansen Tasman, who discovered some of the group on March 5, 1643, and called them Prins Wilhelm's Englander. Captain Cook afterwards visited one of the eastern islands, which he named Turtle Island, but it is now known as Vatoa. Some time later escaped convicts from New South Wales settled in the islands, and in this case, as in that of Australia, became in part the effective pioneers of colonisation and European civilisation. These desperadoes entered

with zeal into the quarrels of the native chiefs, and by the use of firearms, previously unknown to the aborigines, they achieved the reputation of super-mortal heroes, and were loaded with favours by those chiefs who were able to win them over to their side, and thus secure the advantage of their superior weapons and prowess. But Fiji is most indebted to the missionaries for its rescue from barbarism, and to the Wesleyan missionaries most of all. Their system of educating the natives is excellent; most of the young people are able to write and read. Their proficiency is very striking, and some of the writing I have seen by native Fijians is like copper-plate. Nor is their religious education neglected. They are strict in the observance of the simple forms of worship in which they have been trained. In their churches, they sing Wesley's hymns, translated into their own language, and that language lends itself with a touching effect to sacred music. It is soft and melodious, like the Italian. In their own homes, at sunrise and at sunset, their prayers and hymns may constantly be heard.

In 1859, the late native king, Cacobau (pronounced Thakombau), offered the sovereignty of the entire group, under certain conditions, to Great Britain; but the Government of that day was consumed by no land hunger, thought that the British Empire was already wide enough, and declined the royal offer. His Majesty Cakobau survived the slight of his generosity for several years, and died in 1883, after the actual cession to the English. A second offer was made in 1874, and it was also declined; but in October of the same year the sovereignty was ceded to the British Crown, through Sir Hercules Robinson, and a charter was soon afterwards issued, constituting the islands a separate colony, His Honour Mr. Edgar Layard being first administrator. In 1874 the first governor, His Excellency Sir Arthur Hamilton Gordon, G.C.M.G., arrived, and formally assumed the governorship on September 1st. The history of Fiji as a British colony extends only a few months beyond a single decade, but it is a record of extraordinary development. Sir Arthur Gordon retired in December, 1880, but not before he had securely laid the foundation of the new colony. He was succeeded by the present governor, Sir C. W. Des Vaux, K.C.M.G., who has left Fiji for the present, and whose authority and influence in his absence are represented by the Honourable Dr. Wm. McGregor, C.M.G. The doctor has secured the highest esteem of the colonists, by reason of his administrative talent

and personal amiability. The Fijian Archipelago lies between 15 deg. and 22 deg. south latitude, and though tropical, the heat is tempered by cooling sea breezes. The climate is, therefore, very healthy, and malarial fevers and other diseases common to nearly all tropical countries, are entirely unknown. For eight months of the year the climate is indeed superb, and it would be difficult to find a superior one on the whole surface of the globe. The mean temperature of the colony is about 80 deg.; 60 deg. is the lowest and 122 deg. the highest temperature which has been noted. I have seen the glass as low as 54 deg. early in the morning in July and August. From Christmas to March is called the hurricane season, but there has been no severe visitation of storms since 1879. There is a dry and wet season; the former is cool, and lasts from May to November, the latter is warm, and lasts from November to May.

TIMBER.

There are many forests of valuable timber of indigenous growth, but unfortunately deforesting is carried on on a considerable scale in clearing lands for agriculture by whites and natives, and fine trees are felled and then burnt off. The native damana is superior to the kauri and pine. There is also assi, vesi, and other woods, very hard, and superior to mahogany. Sandalwood used to be exported largely; but it is now preserved, and prohibited to be cut, and will form a source of future wealth.

The soil and climate of Fiji are favourable to the growth of timber of other tropical countries, such as teak, ebony, satinwood, rosewood, camphor, the South American caoutchouc, guttapercha trees, &c. The country is capable of being converted into a very paradise, and a mine of exhaustless wealth. It is highly favoured by nature, much beyond the average of lands where cultivation has found her choicest homes.

It is bathed in perpetual sunshine,
Kiss'd by aromas of the constant breeze.

I could enlarge, with great pleasure to myself, and possibly with interest to my hearers, on the attractive features, and the great resources of this interesting country; but the more immediate and direct object to-day is to study the trade which in so short a time has sprung up between Fiji and the outer world. The returns for nine years are now complete, and they show the total value of imports and exports as follows:—

GENERAL IMPORTS AND EXPORTS, 1875-1883.

	Total Foreign Trade. £		Imports. £		Exports. £
1875	212,913	....	118,646	....	94,266
1876	198,264	....	94,805	....	103,459
1877	273,749	....	132,855	....	140,893
1878	329,473	....	136,607	....	192,865
1879	311,252	....	142,212	....	169,040
1880	415,269	....	185,740	....	229,528
1881	450,185	....	276,039	....	174,145
1882	493,846	....	303,329	....	190,517
1883	802,592	....	450,594	....	351,998

SUGAR.

About nine-tenths of the trade is with Great Britain and the colonies. Of the exports sugar now stands at the head of the list, although it was only in the year 1883 that it reached that pre-eminence. It is probable, however, that it will further outstrip the other exports, notwithstanding the paralysis that has overtaken the sugar trade. Large quantities of sugar machinery have been imported, and extensive new areas have been put under cultivation. The capital employed in the trade is very large, one single firm having spent upwards of £400,000, a large proportion of which is invested in machinery and plant of the most modern and approved style. There is great activity in this industry, in spite of the serious fall in the prices. The soil and climate are admirably fitted for the culture of the sugar-cane, and Fiji, as a sugar-producing country, can hold its own in the race of competition. It is undoubtedly one of the finest sugar-growing countries in the world. The development of the trade is shown by the following figures:—

<i>Total Exports.</i>		
	Quantities. Tons.	Value. £
1875	96	3,417
1876	265	10,433
1877	482	16,170
1878	548	18,641
1879	785	26,687
1880	593	20,920
1881	684	23,254
1882	1,731	58,857
1883	5,163	175,555
1884 will be about 10,000 tons.		

The quantity exported in 1882 was nearly threefold that of 1881; the export of 1883 was more than threefold that of 1882, and more than ninefold that of 1881. This is indeed a remarkable expansion.

COPRA.

The cocoa nut is extensively grown both by natives and settlers. Copra, the dried kernal of the nut, has long been a principal article of export, and until 1883 took the lead as a native product for shipment. We have seen, however, that sugar now stands at the head of the list. But, unlike the shipments of sugar, a considerable proportion of the total exports of copra are reshipments of produce grown in other islands. The local trade has there so far expanded into a general one and Fiji is now not only a producer but a large buyer and dealer in copra.

The exports for the nine years have been as follows:—

	£		Tons raised in Fiji.		Tons raised elsewhere.
1875	40,058	....	2,397	....	1,474
1876	46,226	....	1,603	....	2,575
1877	79,865	....	4,404	....	1,980
1878	122,764	....	5,572	....	2,830
1879	61,967	...	2,772	....	1,374
1880	109,785	....	5,242	....	2,097
1881	87,048	....	4,779	....	2,753
1882	66,672	....	5,840	....	1,409
1883	81,772	....	4,892	....	1,389

The paper next deals with cotton, the shipments of which appear to have steadily declined since 1879, in which year they reached in value £44,000, whereas in 1883 they were only £25,240.

COFFEE.

The exports of coffee have now reached, for the year, 210,204lb. in quantity, and £9,383 in value; of this the entire quantity in 1883 was raised in Fiji. Great attention is paid to the cultivation of this plant, and the exports will no doubt increase. The aroma of Fijian coffee is exquisite, and is not excelled by that of any coffee grown elsewhere.

TEA.

Tea has also been introduced by the Hon. James Mason, of Tavione. The flavour of this tea is most delicious, and I remember distinctly when at Auckland, New Zealand, a lady assured me that both she and her friends preferred Fijian tea to any other which they had ever tasted. I may also add that, before I left Fiji, the Hon. James

Mason assured me that he intended to plant all his lands with tea, for not only is it a hardy shrub, but it is very profitable.

TOBACCO.

The soil and climate are also well adapted to the growth of tobacco, though there has not prevailed among the natives much practical knowledge in preparing the leaves for the market; but there is no doubt that its cultivation will in the future become an important industry. In some localities the natives grow tobacco to pay Government taxes, and I may remark that payment of taxation in kind from natives is a system which exists. The natives also grow tobacco for their own consumption.

CANDLE NUTS.

Candle nuts are collected by the natives, and are paid as taxes; they are the products of forest trees, and not of artificial cultivation. The exportation of candle nuts has not proved satisfactory so far, and it is on account of the difficulty of separating the outside shell from the kernel; but I have heard in the last few days that this difficulty has been overcome, and a company is now being formed here to erect crushing mills in the islands. The crushed nut contains fully 90 per cent. of pure oil, and I have seen the natives use it to light their houses. *Bêche de Mer* is a marine slug, found on the surface of reefs; they are collected, dried, and exported principally to China, where they are considered a great delicacy.

Sheep and cattle farming is a profitable industry; the mutton and beef are splendid.

FRUIT.

At present Fiji grows bananas, pine-apples, and other tropical fruits for export, and the trade is constantly increasing. A few years ago the whole shipment of bananas was 5,000 bunches per month; but now, such is the increase, that Sydney alone takes 20,000 bunches a month, and would take more, but that the steamers cannot carry them. In all probability, however, shipowners will eventually recognise the value of the trade and its capability of large development. In that case they will set to work to equip their vessels so as to meet the requirements of the trade. The Fijian bananas are superior to those grown in Queensland, and are very much liked all over Australia. Melbourne and Auckland could do with large quantities, but the drawback is that the ships engaged in the trade between Fiji, Melbourne, and New Zealand are at present unsuitable

for carrying fruit. With regard to the bananas in particular, they are generally more or less damaged on the voyage, but those which by chance arrive in good condition bring a high price.

CAPITAL.

Fiji requires capital, as all young countries do, and the land and climate are unsurpassed for excellence. The seat of Government has been changed from Leruka to Suva. Suva has many natural advantages. It is situated on the south coast of the island of Viti Levu, the largest and most populous in the Archipelago; this island has fine rivers, some of them navigable for a considerable distance. Suva has an excellent harbour. The press is well represented in Fiji. There are four newspapers, two of which, the *Fiji Times* and the *Suva Times*, are published twice a week. The *Royal Gazette* is published as occasion requires, and the *Polynesian Gazette* is a weekly paper. To the non-official and independent English press the people are much indebted for their able discussion regarding the politics and interests of the colonies and colonial affairs, and for the checks to Government in regard to all local matters. The desire for confederation with Australia and New Zealand has already affected the settlers, and when an Australian Confederation shall become a matter of fact, as it will shortly become, the Colony of Fiji will form an integral part of the Grand Confederation. Meanwhile it is a British possession, and one of which the British Crown and the British people may well be proud.

ASCENT OF MOUNT RORAIMA, BRITISH GUIANA.

At a recent meeting of the Royal Geographical Society, held in the theatre of the University of London, under the presidency of Lord Aberdare, a letter was read announcing the ascent of Mount Roraima, in British Guiana, by Mr. Everard im Thurn, and some notes on the journey were subsequently communicated by Mr. H. J. Perkins. From Georgetown, on the 4th of February, Mr. im Thurn wrote to Sir Joseph Hooker:—"I have just sent you a most brief telegram (such things are expensive here) which will, I hope, give you the first news that Roraima has been ascended, and I much wish I could write even a brief report to go to you by this mail, but ever since I have been back (we got back four days ago) I have been in bed with the most severe attack of fever and ague that ever befel me, and though the doctor assures me that I have now turned the corner, I am so weak as to be quite unable to sit up. We were quite successful in getting to the top, and have found that the plateau is

by no means the isolated spot it has sometimes been supposed to be. It was, however, a great disappointment to me that our way up being so extremely laborious that it would be quite impossible, without a very large expenditure in somewhat smoothing the path, to carry up hammocks, &c., provisions and firewood (for there are no trees on the top, and it is bitterly cold)—it was a great disappointment, I say, that we could only explore the top for a short distance from the point which we first reached. I see, however, no reason to believe but that the whole top is of one character. The scenery is in the highest degree wonderful. I made many fairly successful sketches, considering that I am no artist, and these will give a very fair idea of the mountain and of the scenery on the top. As I wish to keep the original sketches for the present, to copy them at my leisure, I have just handed the half-dozen most characteristic among them to a photographer, and I hope to send you copies by next mail. The vegetation on top is most wonderful, but somewhat scanty and quite dwarf. I have between 300 and 400 specimens for you. I have also some living plants—*heliampora*, three most exquisite *utricularias*, two of which are, I fancy, new, and a few other things—but as these want much nursing, I have put them into Wardian cases, and shall take them home for the present.”

LORD ABERDARE said that Mr. Perkins, who accompanied Mr. im Thurn in the ascent of the mountain, had fared little better, inasmuch as he also had been severely attacked by fever since his return, and though present that evening, was still too weak to read his notes. This mountain had long presented an interesting problem not only to the geographer, but also to the natural philosopher. It was nearly 9000 feet in height, the last 2000 feet being a precipice up which it was supposed there was no possible access.

Mr. FRESHFIELD, honorary secretary, read Mr. Perkins's notes. The Indian guide to the travellers proved to be a strict Sabbatarian when he reached his village, and would not proceed on Sunday, because he said he must hold service in his church. It was built of logs, and they were surprised on entering to see a large-sized woodcut of Mr. Gladstone occupying a distinguished position on the high altar, along with the first page of an American edition of Mr. James Payn's novel "By Proxy." In this edifice Lunh (the guide) used to hold service from three to five and six times a day, according as the fancy took him, notice having been previously given by blowing a cow's horn. The service consisted of the Lord's Prayer, the Creed, and the Ten Commandments, these being read aloud and repeated in the Macusi language by all the worshippers, who had learnt the words by hearing them frequently repeated. From a village at the foot of Roraima, and 3,751 feet above the sea level, they had a magnificent view of that mountain and of Kukenam, Roraima being about four and the latter three miles distant. These mountains, separated by a wide gorge, seemed like huge, impregnable hill fortresses, with walls from 1,200 to 1,800 feet in height. Spending several days on

the mountain side at different altitudes, surveying the country, and preserving plants, they at last, on the 18th of December, began the ascent of the highest stage, getting up the cliff by a rather steeply sloping ledge. So eagerly were they engaged in collecting specimens that they had gained the top before being aware of it, for near the summit the ledge lost its steepness, and was, as it were, merged in the top itself. A curious sight was presented as they passed the boundary line of the unknown. On all sides were grouped rocks of every shape imaginable—weird, strange, and fantastic. First a row of huge oblong stones that looked like rude cannon placed there to guard the approach; further on another rock like a giant's umbrella on a short thick stem of about four or five feet in height, and others like miniature castles and ruins of old churches, leaning so much that had they not been solidly connected portions of the enormous sandstone bed they would have fallen. They saw no lake, however, but several pools of water here and there. The vegetation on the summit was extremely scanty and insignificant. There were no trees, only small bushes from three to six feet in height, growing at long intervals, and, with the exception of a few scrubby orchids, two species of thick-leaved ferns, and a variety of the red *utricularia* from below, there was no other plant, owing, no doubt, to the absence of soil; for it was not possible for earth to collect on the summit, as it would be almost immediately carried over by the rain water which found its way over the edge of the enormous cliff soon after it had fallen in most splendid waterfalls, some of which had a clear fall of 1,500 feet. They had no sooner accomplished the ascent than an impenetrable cloud of mist enveloped the whole of the upper part of the mountain, entirely obscuring the view, and rendering it difficult to see beyond 40 or 50 yards in any one direction, and putting a limit to their wanderings. After boiling the thermometer, which registered 197 degrees Fahr., the average of five readings, and gave the height (allowing for difference of temperature from sea level) as 8,600 feet, they returned to their hut, but not before Mr. Perkins had tried, with true British instinct, to carve his initials as a memento of their visit; but he found the rock too hard to permit of this. They were only three hours on the mountain top, and on the 31st of January got back to Georgetown, having been absent three months and sixteen days on their journey.

SIR JOSEPH HOOKER expressed his gratification at the result of the expedition, which would, he believed, yield valuable information on many points—ethnological, meteorological, geological, and botanical.

With a congratulatory vote of thanks to Mr. Perkins, the proceedings closed.

NORTH QUEENSLAND SUGAR CULTIVATION: HOW TO CULTIVATE WITHOUT BLACK LABOUR.

BY A NORTHERNER.

(From the *Queenslander*.)

The cultivation of the sugar cane under the system which has been in vogue up to the present time may, practically speaking, be considered nearly at an end, so far as Northern Queensland is concerned. Under that system it has been absolutely necessary that a great deal of the field work should be performed by coloured labour, because, however good the intentions of the white labourer may be, it has been found that he is physically unable to stand the work, and those engaged in the industry having been able to procure a sufficiency of coloured labour have adopted the plan obtaining in other countries, and have not thought of trying any other system.

The time has now arrived when, if sugar is to be successfully grown, very great alterations must be made in the method of cultivation. Black labour is every day becoming scarcer, and there is no prospect of any suitable labour being obtained to take its place.

That an industry such as sugar-growing should be allowed to become a thing of the past, I do not for one moment believe. The country has been found to be admirably adapted to the cane, and so much capital has been expended in the industry that it is not reasonable to suppose that the planters will quietly sit still and suffer themselves to be ruined without making every effort to save themselves. The machinery in a mill may be taken down and removed to another place, but the fences, buildings, clearings, etc., cannot be carried away, and the capital expended upon these and other improvements is such as to preclude the possibility of many of the present planters quitting their present holdings and beginning again in another country. It therefore becomes absolutely necessary for their existence that sugar-growing should continue, and for this purpose, as coloured labour cannot be obtained, it must be done by white men.

This brings us to the question of how to cultivate without black labour, and for this purpose I hold that we must not expect the present planter or those connected with him to do it, or at any rate to take the initiative. This view will, no doubt, be objected to by many, but we must take facts as we find them. The existing planter

has probably come here with capital at his command, and, carrying on under favourable circumstances, has been satisfied to adopt a similar system to that which was customary in other places—that is to say, he employed coloured labour to do the manual work, with European overseers and sugar boilers. This plan has existed since the beginning of the industry, so that certain work has become known as “niggers’ work,” and the prejudice against it amongst those already connected with sugar has become so rooted, that time alone will overcome it, and we must get a class of men who are comparatively free from that prejudice, and at the same time capable of working under a tropical sun. I refer not to German or other European farm labourers, not to small farmers from Great Britain or Ireland, but to the working farmer in the Southern colonies, men accustomed to field work in all weathers, men who will work all day mowing, reaping, or winnowing under a sun that will register 160° or even more, and a scorching hot wind blowing, and yet whose return at the year’s end, after payment of all expenses, is perhaps no more than what they pay their farm hands. This is a class that exists not in ones and twos, but I may say in hundreds and thousands throughout the length and breadth of New South Wales, Victoria, and South Australia, but they are not such as will consent to do the work for others for any amount of wages that an employer could afford to pay, therefore they must have inducements held out to them to do the work for themselves; hence I am of opinion that the Central Mill system is a step in the right direction, and I look forward to its being the system of the future.

I quite agree with the accepted opinion that there is certain work which the ordinary white man cannot perform “under the present method of growing cane,” notably trashing and hoeing. I do not say they have not pluck to try the work if necessary, and to do a certain amount more or less, but experience shows us that their constitution will not stand the work for any length of time in the humid atmosphere that the work is required to be performed; but “if the mountain will not come to Mahomet, Mahomet must go to the mountain;” so if the white men cannot work among canes under existing modes of cultivation, we must cultivate in such a way as will allow of their labour being applicable.

The first thing necessary to be considered is, “Will it pay?” It is always an easy thing by figures to show that any speculation will

pay. I shall not, therefore, give any calculations of my own, but take the estimates given in a prospectus lately issued, and which planters have agreed are fairly within the mark. In it the expenses for the first two years are put down at £12 per acre, while the promoters bind themselves to purchase the cane at 12s. 6d. per ton—a rate which will return to the grower, according to season and cultivation, from £12 10s. to £25 per acre. The price up to the present time has not exceeded 10s. per ton, and the small growers have found it pay very well at that, and as the expenditure after the first crop is comparatively small, and the returns continue at the same rate, we may safely assert that it will pay.

The next point to attain, and probably the most difficult, is to induce the right class of people to leave their present occupations and take up the land here. This may to some appear an easy matter, and had the Central Mill system been initiated and properly brought before the notice of southern farmers, say, two years ago, when the sugar industry was flourishing and the prospects still good, no doubt it would by this time have been well established; but the times are now changed, the price of sugar has fallen and will probably remain low for a length of time, while the cry that the sugar industry is doomed has been so widely circulated that one of the first questions that will be asked, and will require to be answered, is, "How is it, with such prospects as you hold out, the present planters, who have been growing sugar for the last ten or fifteen years, and have participated in the good seasons and high prices that have ruled during that time, now find themselves at the end of their tether, unable any longer to carry on with profit to themselves; and if such is the case, as has been persistently impressed upon us during the last twelve months, how can we expect to succeed where they have failed?"

Many and various reasons can be adduced more or less satisfactory for the present depression in the sugar industry. Some of these have been brought prominently forward, while others, that probably exercise as great an influence, have been kept in the background, the low price and over-production of sugar and the scarcity of cheap and reliable labour being the more prominent, while the absence of any provision for contingencies and the question of interest upon advances have probably as much as anything else to do with the existing state of things; and it is the opinion of many experienced planters that even with the low prices cane sugar can and will be

grown to compete successfully with beet sugar, and also with profit to those connected with the industry.

In order to enable the work in the field to be done by the white tenant-farmer, the cane should be planted in rows sufficiently far apart to allow a current of air and necessary implements to pass, while false combs would enable the cultivator to be worked close up to the cane plants. This plan, in the opinion of practical men whom I have consulted, would result in very nearly as heavy a return per acre to the grower, the quality of the juice would not be deteriorated, while the canes would not be so liable to fungus and insects as at present.

The constant seeking after new and improved implements which has characterised the farmers in the South would very soon result in the invention of labour-saving machinery suitable to their wants; while, instead of expending £12 per acre before receiving any return, I consider this not only unnecessary, but not likely to be incurred. Such an amount might very likely be expended during the lease, but by using the stump-jumping ploughs, scarifiers, and harrows such as are now in general use in the scrub districts in South Australia, a canefield would be planted at not a great deal more expense than is incurred in putting in a wheat crop, and without the loss of time necessary to get the land grubbed.

The area under sugar being so limited, in comparison to a wheat crop, would enable the farmer to expend an amount of labour proportionately, and devote such attention to the crop as would be necessary to bring it to a successful issue.

Many things will have to be done, and money spent, before the class of men such as I refer to will be induced to sell out of their holdings and come to Queensland; but the idea which I wish to bring forward and urge upon the existing planter who is willing to try the Central Mill system is, that sugar cane can be grown in such a way that white men can do all the labour required; that there exists a large class of men with small capital who are quite able to do the work, and may be made willing, if it is shown to be worth their while; that the cultivation by such a class will pay well, and that with the aid of labour-saving implements, of which many of our planters have no conception at present, the first crop can be put in and a return obtained without the expenditure of nearly so much money as is considered necessary at present.

ON PROFITABLE FRUIT CULTIVATION.

By JOHN WATKINS (of Pomona Farm, Withington, Herefordshire).

At the last meeting of the Herefordshire Chamber of Agriculture, Mr. John Watkins read the following valuable paper on "Profitable Fruit Culture":—The most difficult question the English farmer of the present day has before him is, "What will pay to grow?" Corn, cattle, sheep, have all one after another been recommended, but they have all had to give way before foreign competition. In drawing your attention to fruit cultivation as a means of profit I follow in the steps of other eminent cultivators of much wider and longer experience; but what little experience I have had I am pleased to place at your service, as I believe that fruit cultivation may even now be made to make a good return for our energy and outlay. I do not want you to think that I place it before you as the only way to turn your land to a profitable account, or as the royal road to fortune, but I put it forward to the farmer as another string to his bow, for I am a great believer in the old adage, "Do not put all your eggs in one basket," and I believe that Herefordshire, with its grand breed of Hereford cattle, its apples, its hops, and its proportion of both pasture and tillage, has not felt the depression so deeply as those counties where they have had to depend almost entirely on pasture or arable land. Most likely some of you will be thinking, "But how about foreign competition with regard to fruit?" Well, we now import about four million bushels annually, from various countries, of various kinds of fruit; and from the United States alone we get about one million bushels, principally of apples, and this importation has more than doubled itself within the last ten years, and is still likely to increase. In apples they do not beat us in the same way that they do with cattle and sheep, by under selling us, but they beat us in quality and price by sending a better sample, and thus making a much higher price than we are obliged to sell our fruit for. There is no reason why our fruit should not be of the same superior quality which usually characterises their imports, and later on I will try to explain to you my views on this part of the question. I have heard and seen it asserted, that fruit growing does not pay, and I admit that, if carelessly or slovenly carried out, it will not pay, for fruit growing, like any other branch of farming, can only be suc-

cessful when energy and attention are paid to it; but I believe it can be made to pay. As a slight proof that it can do so in this county, I may mention two cases which came under my immediate notice last season. In the one case a small orchard of about three acres was planted with standard apples of good sorts of table and kitchen fruit. The trees were properly taken care of, well manured, and some sorts, being found to grow too freely without bearing, were root pruned, and the result was a magnificent crop of fruit. These, being carefully harvested, realised about £16 per acre, after paying expenses. In the other case an orchard of fruit was placed in my hands for disposal. This orchard is planted with mixed culinary, dessert, and cider apples, with a few inferior sorts, but care being taken in the picking and selection, it made a return of over £15 per acre to the owner, clear of all expenses; both these orchards were under grass, and the grass, therefore, more than paid the rent. I do not say this is anything extraordinary, and doubtless many cases have beaten them in other years when prices were higher; but I ask you what corn land made the same return last season? There are hundreds of acres of orcharding in this county that barely pay the rent and taxes; but why? They are mostly of inferior sorts, neither fit for cider, nor any other purpose, and if there comes a heavy crop of fruit it is nearly all wasted or left to rot on the ground. I believe, whether we plant culinary, dessert, or cider apples, plums, pears, or any of the small fruits, we can still extend our plantations with profit. There is no doubt that the consumption of all kinds of fruit increases with the supply. It is estimated that there is now about 188,000 acres of land under fruit in the United Kingdom, and that we import, as I said before, about four million bushels from other countries; but what is that to supply cooking and dessert fruit, puddings, jam, cider, and perry to our ever-increasing population of over thirty-two millions? We must meet, and beat, foreign competition by improving our quality, and not only does this apply to table fruit, but to cider and cider apples, perry and perry pears. Perhaps the demand for hard rough cider has decreased locally, but its popularity will increase in our large towns if we can only offer them a superior article. In cider fruit, too, we in Herefordshire, with a few other counties, have, practically speaking, a monopoly, for say or do what they will, it is not all, even good, fruit soils, which will make good cider or perry. I ask you, Has fruit decreased in value in the same ratio with other farm

produce? But I find even in my short experience that you cannot pass off inferior fruit, even if rosy and bright, as easily as you could some ten or fifteen years ago. The public have become educated to the fact, that a good-looking or bright apple is not always the best. In those olden times colour was everything towards effecting a sale; now you must have both quality and beauty. There is no doubt that the country is waking up to the fact of the importance of fruit cultivation, and I am glad to see that Herefordshire heads the list as having the greatest increase of orcharding since 1872, and the popularity and increase of apple shows points out the fact that this fruit especially is receiving more attention. At the Apple Congress, held in the Royal Horticultural Gardens, Chiswick, in October, 1883, no less than 10,150 separate plates or lots of apples were exhibited by 236 exhibitors, and the number and names applied to the apples were, including synonyms, 2,020; of these 1,545 were presumed to be distinct varieties, and no doubt there were considerably over 1,000 really distinct varieties exhibited. The greater portion of these were superfluous or inferior, but doubtless many little-known sorts were brought to light, which are extremely valuable, or will prove to be so. I was struck, however, by the very few, if any, really agricultural growers exhibiting, most of the exhibits being either from nurserymen or other trade growers. Anyone who takes an interest in the varieties of apples should procure a copy of the very carefully compiled report of the Congress prepared by Mr. Barron, and published under the heading of "British Apples," as it contains so much valuable information. You have doubtless most of you heard of Lord Sudeley's experiments as a fruit grower. He has planted between 300 and 400 acre of fruit of various sorts in the parish of Toddington, Gloucestershire, and has set up a jam manufactory in the midst, which is leased to Mr. Beach for ten years, and from the business way in which it has been carried out it deserves and is certain to be successful. In Herefordshire we have a soil highly adapted to the growth of apples, and it is to the interest of both landlords and tenants to develop those capabilities. Before extending our fruit plantations, and to do so successfully, we must take into consideration the following:—What shall we plant? and in what form or way will it bring the greatest return? I believe that the small fruits, such as gooseberries, currants, raspberries, and strawberries pay well, if proper attention is given to them, and also plums, damsons, pears, and cherries; but, as

my paper would be too long if I went into details respecting their cultivation, and as my experience has mostly been with apples, with the knowledge that we can grow this fruit to perfection in our Herefordshire soil, I shall confine my remarks chiefly to apples and their cultivation. I think, too, that apples, and a smaller proportion of plums, damsons, and pears are most likely to have the attention of the farmers, whose knowledge of fruit growing is a limited one. If anyone wishes to gain more information on the cultivation of other fruits, I should recommend him to look up the October number for 1883 of the Journal of the Royal Agricultural Society, in which is a very interesting paper on "The Progress of Fruit Farming," by Mr. Chas. Whitehead, and also to invest in the comprehensive little work, "Fruit Farming for Profit," written by Mr Bunyard. In both these works all fruits are treated with, and I believe there are other publications by the same gentlemen. As regards the form of tree, I am still a great believer in standards, as I think the bulk of the fruit for market will still continue to be produced from this form of tree, and that standards are the most suitable to plant, if you wish to grow fruit in conjunction with other farming operations. Bush cultivation has often been advocated, and, doubtless, could be made to pay, with care and attention, but unless you have time and money at your disposal, or grow them in conjunction with the small fruits, I think this form is not so suitable to the farmer, who has other agricultural pursuits. Standards are objected to by many, for the reason that they are some years coming into bearing, but it is wonderful, if well done, how soon even standard apple-trees begin to bear; and we must bear in mind that the land they occupy is bearing nearly, if not quite, its usual crop while the trees are growing. As regards the selection of sorts, a good sort costs no more than a bad one, nor does it cost more to rear. There is, therefore, no excuse for planting an inferior sort. With the enormous variety now in cultivation there is no lack of choice, and anyone who wishes to thoroughly study the different varieties should purchase Dr Hogg's Fruit Manual, in which almost every known variety is described. Select and plant a good bulk of those sorts which you know to succeed on your land or in your neighbourhood. There are many good sorts which do well in one part of the country and not in another; when a new sort, to your neighbourhood, comes under your notice, even if it is reputed to be a good fruit, try it on a small scale before planting more extensively. Select those which are of good size, weigh well, and are dense in the flesh, as these

mostly carry well to market. As a rule white apples are tender in the skin and easily bruised, and should, therefore, be discarded except for early work. Growing for profit is a very different matter to growing for your own consumption. In the latter case you want a large variety, to have the fruit as long in season as possible; you like the best of quality, even at the expense of quantity, and you do not care whether an apple has a tender skin, or weighs well, so that it cooks well, is of good flavour, and satisfactory when brought to table; but if you are growing for profit you must have quality and quantity. In selecting a culinary apple, select those which have size, weigh well, are of good quality, and preferable of a good colour. For a dessert apple have fair size, good quality, and an attractive appearance; and for a cider apple, select those that are known to make first-class cider, and also have fair size and colour, so that they can be marketed if necessary. I should advise a proportion of the heaviest cropping and largest Bittersweet apples to give the necessary saccharine in which the other apples are deficient. I believe cider apples can be made profitable where the soil is suitable, and I should not like to see them go out of cultivation; but, as in table fruit, we want to cultivate only the best sorts, and discard the inferior, of which there is now such a large proportion. For whatever purpose, with all these qualities, you must have a good, regular, and early bearer, and a sort with a good constitution, which will grow freely and make good-sized trees. Do not be tempted to plant inferior sorts. If you intend growing for profit, you must discard all little apples, however good the quality. I do not intend giving a long list of the best sorts, as I should occupy too much of your time, but I may mention that the following apples, although of the best quality, are too small for market:—Court of Wick, Golden Harvey (or brandy apple), Old Golden Russet, Downton Pippin, Pearson's Plate, Sam Young, and many others; and that the following are a few varieties which succeed in most soils, and should be planted largely:—Early culinary apples: Yorkshire Beauty, Keswick Codlin, and Ecklinville Seedling. For gardens or dwarfs Lord Suffield cannot be beaten, but I have never had great success with it as a standard, as it grows too straggling, and is too tender. I do not consider it is equal to the old Keswick Codlin for orchards. For mid-season and late culinary apples, I think Beauty of Kent, Warner's King, Mère de Ménage, Hambledon Deux Ans, Blenheim Orange, and Dumclow's Seedling amongst the best; the

latter should always be planted largely, as it meets nearly all the requirements of a market apple, and under the name of Wellington, makes nearly the highest price in the London markets. The worst fault of the Blenheim is that it bears badly when young, but fully-grown trees bear heavy crops. Tom Putt and Summer Quoining are also two more very good local apples, and deserve to be widely known. For early dessert apples, the following are good: Devonshire Quenden, Duchess of Oldenburgh, and Worcester Pearmain; the two latter, though not of the finest flavour, are very attractive in appearance, heavy croppers, and always sell well. For mid-season and late dessert apples King of the Pippins (called also Prince's Pippin) and Seek-no-Further. Cox's Orange Pippin is of the finest flavour and mostly succeeds, but with me does not crop well. Duke of Devonshire and Mannington's Pearmain are two of the finest late apples, both of good flavour and good croppers. For cider apples, I consider Cherry Pearmain, Cowarne Red, Forest Styre, and Kingston Black amongst the best, as they will also do for market. For cider only I can recommend Broad-leaved Norman, Royal Wilding, and Handsome Norman. These are bittersweets, make the finest cider, and are especially valuable for mixing; the first-named especially being an immense cropper. Do not plant too many sorts. This was one of the greatest errors of our earlier planters. In the great majority of our old orchards you hardly saw two trees of the same sort together, and even now I have often seen farmers select also as many sorts as they buy trees. You want a bulk of each sort, that it may be worth your while to harvest, keep and market them unmixed, and, to facilitate this, plant each sort in rows, or adjoining rows. Still you want a variety, so that you may not have all your crop to market and harvest at the same time. I have seen it advocated lately that you should plant whole orchards of one sort. I should not recommend this unless you go in for fruit-growing very extensively, and can afford to have a total failure on some of your orchards occasionally, for often one sort will bear when others fail, many sorts bearing alternate years, and if you have a fair variety you seldom have a total failure, and can pick each sort as it ripens in succession. When you select your stocks have them of good size and healthy, but not too large; a young healthy stock of fair size will often outgrow a large rough one, as it does not feel the check of removal so much. It is a great mistake to think that a stock is the better from being off a poor soil. It is then

mostly stunted in growth, and, like all young things, if starved when young, seldom fairly recovers. Plant medium-sized late apples in exposed situations, and large ones where more sheltered. I have heard some people advocate wide planting, and some the reverse, but I believe a medium distance is the best, varied according to the soil and situation. If you have an exposed situation plant rather thickly, say 18 to 20 feet apart, but if you have a sheltered situation, with a good, deep, and generous soil, give the trees plenty of room, 30 feet or more. A very good plan is to plant apple or pear trees alternately with plums. The plum tree is a much shorter-lived tree than the apple or pear, and comes into bearing sooner, thus bringing in a return till the other trees get fully grown. Another plan, where you know or can ascertain the relative growth of particular sorts of apples, is, to plant a strong grower, and a small grower alternately, each way. You thus give the strong trees more room without overcrowding the others, and still have them sufficiently near to harvest together. Yet another plan is, to plant them in hexanogal form, instead of square; that is, instead of the trees being exactly opposite each other in adjoining rows, they are midway, thus giving more room to each individual tree without increasing the distance between or in the rows. In filling up old orchards never plant in the old holes; it is better to get the trees planted irregularly, than to do this. Autumn-planting is mostly the best, although, if carefully done, it will do up to March, and if you have a cold, wet soil, I should prefer spring planting, not too late. If you plant tillage land, steam cultivate or subsoil it, if possible; and if pasture land, plant in large holes not less than 3 feet 6 inches square; move the soil to a depth of not less than 30 inches, and fill up again with the old turf and topsoil, placing some fine soil amongst the roots, but by all means do not plant too deeply, but rather err in the other direction. Deep planting is one of the most frequent causes of trees doing badly. As soon as planted stake securely, as the trees root much quicker when not moved about by the wind. Newly-planted trees are much benefited by a thick surface-dressing of dung or other manure. Applying the manure in this way is a much better plan than placing it in the holes, as it acts as a mulch, keeping the surface moist, and the trees also get a gradual benefit from the manure.

(To be continued.)

Correspondence.

LOUISIANA SUGAR EXCHANGE.

Louisiana Sugar Exchange,
[New Orleans, April 17th, 1885.]

TO THE EDITOR OF THE "SUGAR CANE," Manchester, England.

Dear Sir,—In your April number I find an article copied from the *Deutsche Zucker Industrie*, reflecting on this Exchange.

I mail you to-day the *Sugar Bowl* of November 15th, and call your attention to the resolution adopted by the Sugar Planters' Association, which represents the wealth and intelligence of our industry, and which, in justice to us, you should publish. As the conduct of this Exchange—the only one exclusively devoted to sugar outside of Greenock—is controlled by a board of directors in which the planting interest is preponderant, it needs no defence at home, but the attack is made on us abroad, hence this letter.

Yours respectfully,

D. D. COLCOCK, *Secretary*.

The following is the extract from the minutes of the meeting of the Louisiana Sugar Planters' Association, held November 13th, 1884:—

Mr. HENRY McCALL then read the following:—

Resolved,—That the Louisiana Sugar Planters' Association hails with satisfaction the fact that the Louisiana Sugar Exchange has now become a living institution.

That Louisiana sugars are now sold in the Exchange, and buyers are no longer forced to travel through mud or dust to examine goods they may not want.

That the brokers can now sell the planters' produce on the open Exchange where all values become at once apparent.

That this step forward on the part of the sugar brokers and factors of New Orleans demands recognition from the sugar planters, and the concentration in New Orleans, as far as practicable, of the Louisiana sugar business.

We readily comply with the request of the Louisiana Sugar Exchange to insert the foregoing letter; though we must say that we cannot see that anything was needed to be stated in their justification. No one, we should have supposed, would have laid to their charge the fact that sugars sold there are sometimes "slaughtered;" if sugars are sold at ruinous prices, it is because the supply exceeds the

demand; at least this is the inference which a business man would draw.

The impression produced on our minds, upon reading the account of the Louisiana sugar industry, referred to, (see April *Sugar Cane*, page 201) was that the industry is in a very bad way. Nineteen out of every twenty planters appeared to be pursuing their calling with insufficient means, and consequently are compelled to borrow: and having to borrow, if they pay a high and ruinous rate for interest, commission, and other charges, it is because better terms cannot be obtained. Like other protected industries, the Louisiana sugar manufacturers are working upon sufferance. A change in the fiscal arrangements of their Government, in respect to sugar, may any day affect, and, possibly, destroy their prospects. The fear, at any early date, of some such change, is sufficient to induce a feeling of great insecurity, which is enough in itself to account for the evils complained of.—ED. S. C.

NOTES ON BOOKS.

REVUE UNIVERSELLE DES PROGRÈS DE LA FABRICATION DU SUCRE POUR L'ANNÉE 1883-1884. Par François Sachs, Ingénieur (à Gembloux, Belgique) avec la collaboration de MM. Le Docteur, Chemiste, et Abel Raeymaekers, Ingénieur. Troisième fascicule, avec 52 figures. E. Gyot, Bruxelles, 1885.

We have received the third number of this publication, to which we have already alluded in a former issue. The most interesting feature for our readers will be a *résumé* of the various processes in use in the manufacture of cane sugar. These have reference almost exclusively to the methods and machinery employed in Java, Guadeloupe, and Martinique, there being only one mention each of Cuba and North America. A short supplement at page 361 is devoted to the hitherto abortive attempts to make the extraction of sorghum sugar a paying undertaking. At the end of this number there is also a short *résumé* of the manner and cost of cultivation of cane sugar, again confined to Guadeloupe and Martinique. The greater portion of this number is, however, as heretofore, taken up with beetroot sugar, especially the cultivation of the root, the preparing of the soil, the different kinds of seeds, the insect enemies of the plant, and the economical questions connected

with these. The work, which is illustrated by 52 figures, cannot fail to be highly interesting and valuable to those concerned in the production of beet-root sugar.

The compiler notices our remarks, made in January number of this journal, page 3, respecting the relative sweetening properties of cane and beet sugar, and applauds our proposition that a practical experiment should be made in this direction, maintaining, however, that the result will be precisely the opposite of what we have asserted. Upon this point we may have something further to say later on.

OHLENDORFF'S DISSOLVED PERUVIAN GUANO AND MANURES FOR THE COLONIES.

This neatly got up pamphlet of some 50 pages, has a special interest for our planters. It deals with the different sorts of manures, best suited for cane, tea, coffee, and tobacco growers, with directions as to the mode of application. It contains a number of extracts from letters from planters who have used these manures, in the different Islands of the West Indies, in Java, in the Hawaiian Islands, &c., which form a useful reference for other planters, who may be desirous of obtaining information from those who have practically tested these manures, and who can speak from their own experience as to whether the cost thus incurred is justified by the result secured.

At the Industrial Exhibition, at the Barbados Agricultural Society, held in December, 1883; the canes which carried the first prizes, both for plant canes and ratoons, were manured with Dissolved Peruvian Guano, and special cane manure.

We notice, also, extracts from opinions of eminent chemists, such as Dr. T. L. Phipson, and the late Dr. Voelcker, and from chemists in the colonies, as to the value of these particular kinds of manure.

Few will dispute, that if our cane growers are to hold their own against their formidable competitors, the beet producers, it can only be by availing themselves of the latest and best improvements, and the first step in this direction is adjusting the soil to its requirements. It is to the special attention which the Germans have given to these particulars, that they have been able to obtain such considerable results.

THE BERNARD, EHLMANN, ICERY SUGAR PROCESSES. E. Packard and Co., Ipswich. 1885.

This little pamphlet, which has just been issued, appears very opportunely at the present time. We have received several letters asking for information respecting the "Bernard-Ehrmann process for treating cane-juice," and on the use of "Phosphoric Acid, the new Clarifying and Discolourizing Agent,"—which are dealt with in this short account,—from which we extract the following:—

How to cheapen the cost of production of cane sugar so as to compete with the beet sugar industry of Germany and elsewhere is one of the most important questions of the day, and the one vital point which affects the very existence of our West Indian Dependencies as sugar-growing countries. Relief from Governmental measures, based upon alterations in the present fiscal arrangements, can only be brought about after much consideration and almost interminable discussion, whilst immediate relief is required. Happily, experienced chemists in the Mauritius have brought to perfection a process by which not only can a considerable saving be effected in the working of a sugar-house, not only simplifying the apparatus in ordinary use, but at the same time producing a result at once less costly and unique in the facility with which it can be adapted to existing "plant." Moreover, with slight expense, any factory, however small, can use the process or a modification of it, and at once produce an economy in working, the importance of which in the present crisis it would be difficult to over-rate, thus obviating the necessity for entertaining the proposal "that the way out of present difficulties is the establishment of 'Central Factories,'" a proceeding or remedy requiring an enormous capital at a time when it is not easily obtainable, and necessitating much delay before any advantage could be reaped. With the Bernard-Ehrmann process the case is different; an immediate saving may be effected by the means it affords of producing "on the Estate" the finest qualities of sugar, and such as would realize the highest price in the "consuming" markets, and at a cost scarcely in excess of that for producing the lower qualities usually made. Mauritius has long been recognized as one of the most scientific and advanced of the sugar-producing colonies; we may therefore say, without fear of contradiction, that a process which has so grown in four years as to require some 500 tons of Messrs. Packard's manufactures in its operation may unhesitatingly be adopted in other places; for such a rapid development could only have arisen from causes that have produced an economy in working, or the production of a more valuable class of sugar; both these advantages are claimed by the inventors for their process, and substantiated by the results obtained. Some of those well experienced in the question of cheapening the cost of cane sugar have come to the conclusion that the chief advantage to be gained is by having recourse to methods of operation hitherto employed only by the refiner. Mr. Santiago Dod, in writing in the *Neuve Era*, takes this view of the question, and writes: "But our argument will have greater force the moment he shall have at his disposal a much simpler, a more economical, and more perfect process, such as the discovery made by Dr. Icery and Messrs. Bernard and Ehrmann."

Then, again, it has been pointed out by several experienced planters that a remedy is much needed to counteract the evils of under or over tempering the juice. Mr. Guy, of Antigua, writes as follows: "There is no doubt we require some better process in the clarification of cane juice. Under the *present system* it is not at all fairly dealt with, nine-tenths of the sugar being unevenly tempered, and as there is no possible means of counteracting this evil with the men who are employed on the estates as sugar-boilers, I certainly think it would be a great boon to planters to adopt the 'Bernard-Ehrmann' process, so that all this excess of lime may be nullified."

This testimony alone would be sufficient to draw attention to the value of the discoveries to which we are now drawing attention, but we would also allude to the careful investigations carried out and reported upon by Mr. George Hughes, F.C.S., and Mr. A. P. Murray, who state that the addition of the phosphoric acid (Ehrmannite, &c.) "is perfectly harmless and does not injure the sugar; we are enabled to employ much more lime than we can now venture to put in, the ill effects of what we should call over-tempering being nullified by the addition of the acid, which precipitates the lime into the mud, enriching that with phosphate of lime, and at the same time securing to us a very superior clarification to what we can now obtain."

An estate manager in Queensland writes: "By using this process your percentage of molasses will be very largely reduced at the end of the season, and your sugars far better in quality and larger in quantity, with an absence of stickiness in all the products."

Mr. Leon Depétasse, of Lajas, writes: "That after having experimented with the process he has no hesitation in saying that it is a great advantage for the clarification of cane juice," and similar testimony has been received from every colony in which experiments have been commenced, resulting in arrangements being made for extended and exhaustive trials, or in the immediate adoption of the process either in its entirety or in a more or less partial form.

It will thus be seen that the advantages proved to be attained by the process may be recapitulated as follows:—

1. Increased yield of sugar.
2. Improved quality of sugar.
3. Proportion of molasses reduced.
4. Great economy effected.
5. Necessity for charcoal filters obviated.
6. Superior clarification obtained.
7. More lime may be employed in defecation.
8. The evils of over-tempering counteracted.
9. The cost of the reagents is recovered in its value for manuring the next crop.
10. Greater proportion of first-quality sugar produced.

The experience of several years' work in the Mauritius has brought out the weak points in the substances originally employed, and enabled the inventors to ascertain accurately the exact requirements when practising on a large scale and in the largest factories, where the most perfect and

delicate machinery has to be dealt with. It was found necessary that the precipitant should be as pure as possible and with a minimum combination of extraneous matter; further, that the earlier method of applying it in the form of a powder caused some trouble by its imperfectly dissolving, and thereby causing irregularity in the work, hence the new form—"Ehrmannite"—was adopted, it being readily and entirely soluble in water or in cane juice, and, therefore, it could be much more easily and accurately dealt with, the effect of the addition of a solution of Ehrmannite being at once ascertainable, and further additions may be made, as required, with great nicety, so that the whole advantage may be obtained with perfect ease, the Ehrmannite being a great advantage, causing a more bulky precipitate than any other substance, giving no incrustation on the tubes of the triple effect, and yielding a higher class of sugar.

"EHRMANNITE."

It is scarcely necessary to remark that the name given to the substance now to be described is derived from that of him who first suggested the possibility of manufacturing such substance, and to whom is chiefly due the credit of introducing these new and important improvements in the manufacture of cane sugar.

Ehrmannite is a crystalline substance containing no impurities, and as large a percentage of free phosphoric acid as is compatible with portability. It possesses greater advantages for these processes than any other substance, and is superior to either phosphoric acid, solid phosphoric acid, or double and triple patent superphosphates.

Ehrmannite is manufactured of two qualities, "A" being the highest, and containing about 55 per cent. of soluble phosphoric acid. "B" quality contains rather more moisture, which, however, is in no way detrimental, but the contrary; it contains 40 per cent. of soluble phosphoric acid. Before use they should be dissolved in either cane juice or water, in which they are easily soluble.

SOLID PHOSPHORIC ACID.

This is a patent superphosphate of the highest grade, containing from 47 to 52 per cent. of phosphoric acid. It is specially prepared for use in the sugar processes, and is at the same time in a mechanical condition suitable for manure, and will be found most useful on estates where circumstances render it desirable not to keep many varieties of such substances in stock, as it possesses the advantage that, in case any is left over from the "Sugar House," it may be used on the estate for manuring the succeeding crop, or *vice versé*. It is a dry powdery substance, and has given great satisfaction in all cases where it has been used. It is a purer and more suitable substance for the defecation of cane juice than the patent superphosphate formerly so largely employed.

About one-half of the pamphlet is occupied with reports from estates in Mauritius, Cuba, Barbados, Trinidad, &c., where these processes have been in operation.

We have no doubt Messrs. Packard & Co., of Ipswich, will be happy to furnish any planters with fuller details than are here given, upon hearing from them.

MONTHLY LIST OF PATENTS.

Communicated by Mr. W. P. THOMPSON, C.E., M.S.C.I.,
Fel.Inst. P.A., Patent Agent, 6, Lord Street, Liverpool; and
323, High Holborn, London, W.C.

ENGLISH.

5399. WILLIAM R. LAKE, London. (In trust for Friedrich Napravil, Austria.) *Improvements in the manufacture of sticks or bars of sugar, and in apparatus therefor.* 1st May, 1885.

5903. OLIVER IMRAY, London. (In trust for Henry B. Scott, France.) *An improvement in filter presses.* 13th May, 1885.

5958. FRIEDRICH GRURING-DUTOIT, London. *A new domestic implement, intended to split and saw wood and to break sugar.* 14th May, 1885.

ABRIDGMENTS.

2553. HENRY J. CHAPIN, City and State of New York, U.S.A. *Improvements in apparatus or devices for the treatment of sugar cane.* 25th February, 1885. This apparatus consists in 1st, a cane carrier delivering the cane to a shredder; 2nd, a shredder formed of two drums or shafts carrying toothed rings fixed in face, contact with each other and said rings strengthened by radial webs having their teeth formed on their angular faces, the whole working in a hopper; 3rd, a water-tight chute, delivering the shredded cane and juice to the extractor; and 4th, a three-roll extractor of ordinary construction. The whole combined together to form one machine.

8686. F. W. TOMPSON, F.C.S., Burton-on-Trent. *Improvements in the manufacture of invert sugar from saccharose.* 7th June, 1884. This consists in employing (for the inversion of any commercial saccharose) yeast at a temperature of from 95 degrees to 160 degrees, or of yeast previously heated for a few minutes to 120 degrees. Under these conditions, yeast is stated not to act as a ferment to convert sugar into alcohol and carbonic acid, but yet to retain the power of inverting saccharose.

9243. CHARLES D. ABEL, London. (Communicated from abroad by Hippolyte Leplay, Paris.) *Improvements in osmose apparatus.* 20th June, 1884. This elaborate specification, the drawings of which contain 23 Figures, describes a "steam osmogene with triple action," whereby is effected, firstly, the separation by osmose action of the salts and other more diffusible matters; secondly, the evaporation of the waters of exosmose; and thirdly, the evaporation of the osmosed liquids, the said apparatus consisting mainly of two superposed compartments separated by a diaphragm of parchment paper fixed between the sides of the compartment and situated between two

sheets of wire gauze; the lower compartment, containing the waters of exosmose, being provided with a heating coil and with a table for collecting the water of condensation, while the upper open compartment containing the liquor to be osmosed is provided with means for cooling the liquid, either by the circulation of water or by jets of air, also a modified apparatus wherein vertical or slightly inclined diaphragms of parchment paper form the sides of troughs situated above a boiling pan and containing the liquid to be osmosed, the said diaphragms being supported by sheets of wire gauze or perforated metal having cotton wicks or small gutters. The inventor also claims the method of forming the troughs for the liquid to be osmosed by means of frames and wedge-shaped pieces secured together side by side between end plates that are bound together by screws, the liquid being supplied simultaneously to all the troughs by means of a pipe extending along the whole length of the apparatus; also two forms of apparatus in which any desired number of superposed compartments are separated from each other by horizontal parchment paper diaphragms, supported between sheets of wire gauze, whereby an apparatus having a considerable effective surface of parchment paper, while occupying a comparatively small ground space, is obtained, in one of which cases multiple successive osmose actions are produced, and in the other one alternate set of compartments contains the liquid to be osmosed and cooled by coils, and the other alternate set are heated by steam.

314866. GEORGE MURDOCH, Brooklyn, New York. *Bone-black Oven*. March 31, 1885. A series of bone-black ovens have, in addition to a lateral furnace, narrow vertical flues between them, into which the gases from the oven rise by a series of inclined pipes. The bottoms of the ovens are contracted and closed by a slide, and below the ovens are large cooling chambers with sliding bottoms.

314880. EDWARD C. ROETTGER, Brunswick, Germany; assignor of two-thirds to HEINRICH PERSCHMANN and CARL HAMMER. *Continuous-acting centrifugal drying machine*. March 31st, 1885. The present invention relates to that class of centrifugal machines in which two saucer-shaped vessels are so placed upon a rotary shaft as to leave a discharge aperture for the drained material between the lips or edges of said vessels. In such machines it has heretofore been customary to separate the two halves of the rotary drum in order to discharge the solid contents, or else such drum has been made of two sections, which are connected by plates, so as to form a permanent space between the sections of the drum, which space is closed by an angle-iron ring that uncovers the space when the drum is moved away from the same. By this invention provision is made for the automatic opening of the space between the two sections comprising the draining vessel operating by the pressure of the material being acted upon. The

upper half of the drum is weighted so as to rise, and allow the material to escape when this pressure exceeds a given amount.

315696. JOSEPH W. BABBIT, Hiawatha, Kansas. *Evaporator*. April 14th, 1885. This consists in "an evaporator pan having a longitudinally corrugated bottom, provided at one end with an intersecting transverse gutter, and abutting at the other end upon a smooth rounded and upwardly-curved section, the smooth bottom of which is on a level with the top of the raised parts formed by the corrugations in the bottom.

315837. JOSEPH W. J. REFORD, Jersey City, New Jersey. *Revivifying filtering material*. 14th April, 1885. The admission to the filter of syrup or other substances to be filtered is stopped. A jet of live or prime steam is then introduced into the latter, preferably at the bottom thereof, and it permeates the mass of filtering material, being in part condensed therein, and in part passing through the same, dissolving and carrying off the soluble impurities contained therein, and more or less of it escaping from the vessel. When the mass is thoroughly saturated with the condensed steam, the supply of steam is stopped, and the mass is left to digest for a longer or shorter time, say for about four hours, its temperature being kept up to a uniform degree by any suitable means of heating; superheated steam is now sent through the mass, the material being kept constantly stirred by a longitudinal shaft and stirrers passing through the filter and permanently fitted therein.

GERMAN.

ABRIDGMENTS.

28353. LOUIS HENRY DESPEISSIS, Paris. *Process for treating saccharine juices by electricity*. 30th August, 1883. The carbonates and saccharates contained in the saccharate juices are decomposed by the electric current in such a manner that the carbonic acid and the sugar separate at the positive pole, while the alkaline hydrates and bases collect at the negative pole. After this process, the negative pole plate is placed in a porous vessel, which is filled with water. The hydrates collect in this vessel, and can then be removed.

28395. FRITZ KLEEMANN SCHONINGEN, Brunswick. *Process for purifying saccharine juices, syrups, and other liquids by brown coal or peat*. 14th February, 1884. The mucilaginous, gummy substances to be purified are filtered through brown coal or peat, or mixed with the powder of the latter, and then pressed out. The brown coal or peat can afterwards be used for fuel.

28990. F. W. WALLNER, Ehrenfeld, near Cologne. *Root cleaning machine, with cylindrical brushes*. 12th February, 1884. The roots pass through an annular space between two brush cylinders arranged one within the other, of which either one or both rotate. The roots are guided in their

passage by strips of sheet metal, the teeth of which help to keep the brushes clean.

29024. CARL PELLEENZ, Hennef on the Sieg. *Improvement in machines for cutting potatoes and similar tubers.* 19th January, 1884. The revolving drum of the machine, which is provided with knives for pulping or slicing potatoes, does not consist as heretofore of a single cone, but of two or more cones which come in contact with one another at their smaller ends. By this means the action of the machine is equally distributed throughout the grinding surface, while the side pressure exerted by the tubers upon a single cone is avoided.

29025. PAUL FLIESSBACH, Kurow, near Zelasen. *Process for the treatment of the pulp obtained in the manufacture of potato starch to produce dextrine, grape sugar, treacle, &c.* 22nd January, 1884. During the treatment of the pulp with acids, the cellulose swells to such an extent that, unless destroyed, the whole process would become unprofitable. To this end the pulp is placed in pits with perforated bottoms until fermentation is over, taken out when in a pasty condition, aerated and again left to ferment in a moist state. The mass passes through the various stages of fermentation up to the acetic without perceptibly affecting the starch granules. After fermentation the mass is freed from its unpleasant smell by prolonged kneading or drying, and then treated further in the usual manner.

Patentees of Inventions connected with the production, manufacture, and refining of sugar will find *The Sugar Cane* the best medium for their advertisements.

The Sugar Cane has a wide circulation among planters in all sugar producing countries, as well as among refiners, merchants, commission agents, and brokers, interested in the trade, at home and abroad.

NEW YORK PRICES FOR SUGAR.

From Willett, Hamlin & Co.'s Report, May 14th, 1885.

FAIR REFINING.	96° CENTS.	GRAN- ULATED.	STAND A.	STOCK IN FOUR PORTS.
May 14, 1885.—4½c.	5½c.	6 7-16c.	5 15-16c.	Jan. 1, 1885—89,186 tons.
May 15, 1884.—5 5-16c.	6½c.	7 1-16c.	6½c.	Jan. 1, 1884—60,900 tons.
May 17, 1883.—7½c.	7¾c.	8 13-16c.	8¾c.	Jan. 1, 1883—50,297 tons.
May 18, 1882.—7¾c.	8 3-16c.	9 1-8c.	9 5-16c.	Jan. 1, 1882—43,927 tons.
May 19, 1881.—7 7-16c.	8½c.	10c.	9½c.	Jan. 1, 1881—66,999 tons.
May 13, 1880.—7 9-16c.	8 9-16c.	9 1-4c.	8 1-4c.	Jan. 1, 1880—63,558 tons.
May 15, 1879.—6 5-16c.	7 3-32c.	8¾c.	8 5-8c.	Jan. 1, 1879—50,773 tons.
May 16, 1878.—7½c.	8c.	9½c.	9-9½c.	Jan. 1, 1878—48,230 tons.
May 17, 1877.—10c.	11c.	12½c.	11 1-4c.	Jan. 1, 1877—25,885 tons.

IMPORTS OF FOREIGN REFINED SUGAR.

The British Sugar Refiners' Committee furnish us with the following figures, giving the imports of foreign refined sugar for the month of April compared with the corresponding month of last year, and the average monthly imports for the year compared with those of 1883 and 1884, distinguishing the quantities of "Lumps and Leaves" from "other sorts," and giving the separate imports from each country:—

	"LUMPS AND LEAVES,"						"OTHER SORTS," Including Crushed Loaf, Granulated, Crystallized, &c.						TOTAL.					
	Monthly Average.			April,			Monthly Average.			April,			Monthly Average.			April,		
	1883.	1884.	1885.	1885.	1884.	1884.	1883.	1884.	1885.	1885.	1884.	1884.	1883.	1884.	1885.	1885.	1884.	1884.
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
France	3538	2737	2417	2053	3644	2477	1853	1948	606	472	1720	6015	4205	5528	3976	5853	5488	5364
Holland	2352	3580	4267	4333	3249	1854	1854	2380	1709	1520	2239	2442	2932	4986	4411	2180	221	2861
Germany & Austria ..	588	552	813	842	243	124	124	151	119	127	153	443	334	349	478	221	221	221
Belgium	319	183	230	351	68	234	234	3386	6715	12342	1593	520	4348	7147	12957	2861	75	75
United States	226	902	432	615	1268	61	61	121	18	..	75	61	121	22	..	..	..	..
Other Countries ..	..	..	4	..	..	6663	6663	9607	13310	18030	7717	13686	17621	21503	26224	16189	16189	16189
Total	7023	8014	8193	8194	8472	8472	8472	9607	13310	18030	7717	13686	17621	21503	26224	16189	16189	16189

SUGAR STATISTICS—GREAT BRITAIN.

TO MAY 16TH, 1885 AND 1884. IN THOUSANDS OF TONS, TO
THE NEAREST THOUSAND.

	STOCKS.		DELIVERIES.		IMPORTS.	
	1885.	1884.	1885.	1884.	1885.	1884.
London	93	110	133	138	136	162
Liverpool ..	118	100	102	103	108	126
Bristol	5	6	21	20	22	20
Clyde	87	67	92	93	130	98
Total ..	303	283	348	354	396	406
	Increase..	20	Decrease	..6	Decrease	..10

SUGAR STATISTICS—UNITED STATES.

(From Messrs. Willett & Hamlin's Circular, New York.)

FOR THE FOUR PRINCIPAL PORTS. IN THOUSANDS OF TONS, TO THE
NEAREST THOUSAND. FOR APRIL, 1885 AND 1884.

	STOCKS.		DELIVERIES.		IMPORTS.	
	May 1st,		For April,		For April,	
	1885.	1884.	1885.	1884.	1885.	1884.
New York	85	73	88	67	98	75
Boston	26	21	19	18	22	19
Philadelphia....	6	5	12	8	14	9
Baltimore . . . . .	..	1	..	..	..	..
Total.....	117	100	119	93	134	103
	Increase..	17	Increase..	26	Increase..	31
Total for the Year ..	..	..	390	354	418	392

In the case of Baltimore, where nothing is put down, it means that the Stock, Imports, and Deliveries, do not exceed 500 tons in each case.

STOCKS OF SUGAR IN THE CHIEF MARKETS OF EUROPE ON THE
31ST MARCH, FOR THREE YEARS, IN THOUSANDS
OF TONS, TO THE NEAREST THOUSAND.

Great Britain.	France.	Holland	Germany (Zollverein)	Four other entrepôts.	TOTAL 1885.	TOTAL 1884.	TOTAL 1883.
288	235	47	238	45	853	721	569

CONSUMPTION OF SUGAR IN EUROPE FOR THREE YEARS, ENDING
31ST MARCH, IN THOUSANDS OF TONS, TO
NEAREST THOUSAND.

Great Britain.	France.	Holland	Germany (Zollverein)	Four other entrepôts.	TOTAL 1885.	TOTAL 1884.	TOTAL 1883.
1128	433	48	381	316	2306	2265	2165

ESTIMATED CROP OF BEET ROOT SUGAR ON THE CONTINENT OF EUROPE,
FOR THE ENSUING SEASON, COMPARED WITH THE ACTUAL CROPS
OF THE THREE PREVIOUS SEASONS.

(From *Licht's Monthly Circular*.)

	1884-85.	1883-84.	1882-83.	1881-82.
	Tons.	Tons.	Tons.	Tons.
France.....	325,000	.. 473,676	.. 423,194	.. 393,269
Germany(Zollverein)	1,150,000	.. 986,403	.. 848,124	.. 644,775
Austro-Hungary....	540,000	.. 445,952	.. 473,002	.. 411,015
Russia and Poland ..	370,000	.. 307,697	.. 284,991	.. 308,799
Belgium	90,000	.. 106,586	.. 82,723	.. 73,136
Holland and other Countries.....	50,000	.. 40,000	.. 35,000	.. 30,000
Total.....	2,525,000	2,360,314	2,147,034	1,860,994

Mr. Licht's present estimate shows a surplus of about 165,000 tons upon 1883-84,—of which Germany contributes 163,500 tons; Austria, 94,000 tons; Russia, 62,500 tons; and Holland, 10,000 tons. On the other side is to be set, the deficiency in France of 148,500 tons, and Belgium of 16,500 tons.

STATE AND PROSPECTS OF THE ENGLISH SUGAR MARKET.

The raw sugar market has been very excited during the past month, and the price of beet (88 per cent. f.o.b.) has gone up 3s. 6d. per cwt. in the four weeks; present prices are 16s. 3d. prompt, 16s. 4½d. July, 16s. 7½d. August. For anything like a parallel to this advance, we must go back to the autumn of 1876, when, owing to the failure of the beet crop that year, prices went up 9s. per cwt. in about as many weeks. The minimum estimate of the reduction in the total of the next European crop is 300,000 tons, whilst other estimates put it down at 500,000 tons, or even more than this.

The advance in cane kinds has not been so marked as in beet. Jaggery has gone up 1s. 6d. per cwt., Brazils 2s. per cwt., Java 3s. per cwt., and West India 2s. 9d. per cwt.

The advance in refined sugars is from 1s. 9d. to 2s. 6d. Tate's Cubes are 23s. 3d., which is 3s. 3d. per cwt. less than they were in March last year, when the price of raw sugar was the same as now.

The recent rise in raws has been so great, that the question is asked, Can present prices be maintained? We think they will, for the reasons which we give at page 285.

On the 16th March, 1885, the deliveries in the United Kingdom show a decrease, as compared with the same period in 1884, of 5,531 tons; and the imports show a decrease of 9,993 tons.

The imports of American refined for the four months ending April, 1885, are 27,689 tons, against 6,077 tons for the first four months of 1884.

The stocks in the United Kingdom on the 16th March, 1885, were 302,651 tons, against 283,365 tons in 1884, and 241,617 tons in 1883.

The present quotations for the standard qualities, as under, are:—


FLOATING.		Last Month.
Porto Rico, fair to good Refining	15/6 to 16/- against	12/9 to 13/3.
Cuba Centrifugals, 96% polarization	17/- to 17/3 ..	14/3 to 14/6.
Cuba Muscovados, fair to good Refining ..	15/6 to 16/- ..	12/9 to 13/3.
Bahia, middling to good Brown, No. 7 to 8½	12/6 to 14/- ..	10/6 to 12/0.
Pernambuco, good to fine Brown	14/6 to 14/9 ..	12/6 to 12/9.
Java, No. 14	18/- to 18/3 ..	15/- to 15/3.
LANDED.		Last Month.
Madras Cane Jaggery	10/9 to 11/3 against	9/3 to 9/6.
Manilla Cebu and Ilo Ilo	10/9 to 11/3 ..	9/3 to 9/6.
<hr/>		
Paris Loaves, f.o.b.	19/- to 19/6 ..	17/3 to 17/9.
Titlers	21/6 ..	19/-
Tate's Cubes	23/3 ..	21/-
Austrian-German Beetroot, 88% f.o.b. ..	16/3 ..	12/9

THE SUGAR CANE.

No. 192.

JULY 1, 1885.

VOL. XVII.

 The writers alone are responsible for their statements.

N.B.—All communications to be addressed, and Cheques and P.O. Orders made payable to. HENRY THORP, Ducie Chambers, 57, Market Street, Manchester.

For Scale of Charges for Advertisements, see page xi.

For Table of Contents, see opposite the last page of each Number.

The British Refiners' Committee have addressed a letter to our Board of Trade upon the bounty given by the States on the exportation of refined sugar, in which are given some extracts from New York papers bearing upon this question, see page 351.

The mails for the West Indies will in future be dispatched regularly every two weeks, *i.e.*, on each alternate Thursday, commencing with Thursday, July 2, instead of on the 2nd and 17th of each month, as heretofore.

European beet sugar is making headway in the United States. The imports, for New York alone, this year are three times those of 1884. The figures are, from January 1 to first week in June, 1885, 59,649 tons, against 19,532 tons for same period in 1884.

At page 341 of the present number we give a paper (to be continued), by "Verax," on "The Rise and Progress of Beetroot Sugar in Europe, and their bearing upon the Sugar Industry of America," which we commend to the notice of those of our American readers, especially, who feel favourably disposed to cultivating beetroot, for sugar purposes, in the States.

We are glad to learn that the introduction of the Mongoose into the Hawaiian Islands has been a great success. Thirty-six pairs of this rat-destroying animal were imported some two years ago, into the district of Hilo, with the result of almost instantly

clearing 4,000 acres of cane of this nuisance. One proprietor estimates his saving in cane from this cause, last year, at some £10,000.

We note in the *Planters' Monthly* (Honolulu) that in spite of the low price of sugar, some of the plantations in the Hawaiian Islands are able to declare dividends. The Waimanalo plantation are paying five per cent., and the Kalao Company twelve per cent. Dividends are, however, the exception, and the majority of the plantations will not more than pay expenses, while some are running behind.

As our readers know, by the Reciprocity Treaty, Hawaiian sugars are admitted free into the United States, which gives them an advantage over foreign competitors, in the American market, of some 10s. per cwt.

A Jamaica correspondent writes, May 23, "The absence of rain at this season of the year, following, as it is now doing, upon a prolonged period of intense drought felt generally throughout the Island, is a matter of most serious consequence to us. In some parts of the country water for domestic purposes has to be carried a distance of twelve miles, while the cattle upon our pens and estates in the district where the drought is most severe are dying by the score. In Kingston, well supplied as it usually is with water, it has been found necessary to place restrictions upon its use."

The following notice, dated 86a, Kurfurstad Str., Berlin, W., 16 June, 1885, and signed by Jos. Görz, Ingenieur, appears in the *Deutsche Zuckerindustrie* :—

COLLECTION OF SUGAR SAMPLES.

At the suggestion of the Foreign Office the various samples of sugar collected by the German Consul and Vice-Consuls abroad have been handed over to me. The collection, which facilitates an accurate survey and comparison of the different kinds of sugar which are consumed in any special country, is now arranged, and is open to inspection at my place of business at any time by those interested. I would just remark that the samples are only from 1lb. to 1½lb., and consequently no portion of them can be supplied to anyone.

The collection includes the following districts :—

Asia.

Jaffa	(11)	Damascus	(5)	Calcutta	(19)
Madras	(3)	Saigon	(8)	Bangkok	(8)
Singapore	(6)	Batavia	(9)	Manila	(14)
Shanghai	(14)	Canton	(8)	Hong-Kong ..	(5)
Swatow	(14)	Yokohama	(12)		

Africa.

Tangiers	(4)	Algiers	(4)	Tunis	(6)
Cavis	(10)	Alexandria	(8)	Mozambique ..	(6)
Cape Town	(15)	Sta. Cruz de			
		Teneriffa	(6)		

North and South America and the West Indies.

S. Francisco .. (10)	New Orleans .. (12)	Mexico..... (4)
Vera Cruz (7)	Halifax (4)	Port au Prince. (3)
Havana (15)	Trinidad (6)	Barbados..... (10)
Guatemala (4)	Georgetown .. (11)	Buenos Ayres.. (15)
Valparaiso (10)	Rio de Janeiro.. (9)	Asuncion..... (6)

Australia: Melbourne (12).

The figures indicate the number of samples from the respective district.

Information as to origin, mode of packing, extent of consumption, price, &c., Mr. Görz will be glad to afford, as far as he is able.

In our last number, page 282, we referred to a Parliamentary Return on the German Sugar Bounties, which had then just been issued, containing a valuable report by Mr. Scott, the Secretary of the British Embassy, Berlin; in this report the statement is made that the difference between the actual and legal drawback upon 88 per cent. raw beet sugar was M. 0.93, or 11d. per cwt., which Mr. Scott remarks is much below what it is popularly supposed to be England.

We give below the revenue account for the campaign 1883-84, taken from German official statistics, and, therefore, may be assumed to be correct. From these figures we make the bounty to be 2s. 0½d. instead of 11d. per cwt.

Production of German sugar, 1883-84, as given by Mr. Licht, was 986,403 tons, or 19,728,060 cwts.; the amount received in taxes upon the beetroot was, Marks 142,348,331; this, divided by production in sugar, gives M. 7.21 per cwt. The amount exported (raw and refined) was 11,751,864 cwts. (5,875,932 metric centners), which leaves for home consumption and unexported 7,976,196 cwts.; this multiplied by M. 7.21 gives M. 57,308,373; and this is the amount of revenue, less the cost of collection (which does not come into the calculation), which the German Government would have received were there no bounties—instead of which the amount received was only M. 33,008,547:—

Duty on Roots	M. 142,348,331
Drawbacks on Raw and Refined.....	M. 109,339,784

M. 33,008,547

or a deficiency of M. 24,299,826; if we divide this deficiency, which is bounty, by the amount exported, namely, 11,751,864 cwts., we get M. ~~2.60~~ per cwt., or 2s. 0½d. per cwt.

If we are materially wrong in any of our statements we shall be glad to be put right; if the bounty is really only 11d. per cwt. it will be good news for our planters, but the figures are clearly against such a supposition.

CAMPAIGN, 1883-1884.—1st AUGUST, 1883, to 31st JULY, 1884.

RECEIPTS.

	Marks.
Beetroot duties on 88,967,707 metric centners (8,896,770 tons), worked up, @ M. 1'60	142,348,331
Import duty on imported sugars. viz. :—	
15,225 metric centners, refined.....	M.
262 „ „ raw, No. 19 and } @ 0'30 = 464,610	
above.....	
18,418 „ „ raw, under No. 19 @ 0'24 = 442,032	
34,682 „ „ syrup..... @ 0'15 = 520,230	
45 „ „ molasses @ 0'15 = 675	
68,632 metric centners.	

1,427,547

143,775,878

OUTGOINGS.

Return of duty on exports, viz. :—

	M.
638,818 m. c. candy	@ 22'20 = 14,181,760
299,065 „ other refined sugars ..	@ 20'80 = 6,220,552
4,938,049 „ raw sugar	@ 18'00 = 88,884,882
5,875,932 metric centners.	

During the month of August, 1883, the old drawback of M. 23'00, and M. 21'60 for the two classes of refined sugars was still in force, so that the outgoings on the export in that month were increased by—

53,227 m. c. candy loaves, &c.....	@ 0'80 = 42,582
12,540 „ other refined sugars..	@ 0'80 = 10,008

109,339,784

There remained accordingly	34,436,094
From which have to be deducted the cost of collection of the beetroot duties, 4%	5,693,932
Leaving as net revenue	28,742,162

1882-1883.

1881-1882.

Against M. 46,046,005 M. 37,832,944.

At page 369 we give the first portion of Mr. Scott's exhaustive report, which will be found of great use in discussions on the subject. The remaining portion of the report will appear next month.

THE RISE AND PROGRESS OF BEETROOT SUGAR IN EUROPE, AND THEIR BEARING UPON THE SUGAR INDUSTRY IN AMERICA.

By VERAX.*

Though it is to be feared that much good will not be gained by appealing to the sugar refiners and sugar chemists to stem the tide of German beetroot sugar that is flowing into the United States refineries at a daily accelerating ratio, it is well to attempt to do so by drawing the attention of the American public to the disastrous results that will inevitably accrue to them as a nation by swamping the cane sugar producers; though the small refining interest will benefit largely, for a short time, and suffer seriously for a long time afterwards.

All Americans should be told and shown (some of them need no telling and showing) what their sugar chemists and many of their refiners will not tell and show them, that beetroot sugar, besides being an inferior sugar to cane sugar, has brought loss and disaster on every nation that has grown it—grown it in the hothouse of protection, bonuses, and bounties on export. America has not grown it yet to any appreciable extent, though she has tried to do so, but she gives her refiners bounties—drawbacks—that enabled them with considerable profit to themselves to export largely and increasingly to Britain. We, as a people, do not object to their doing this; we rather like it, the reason whereof we shall see shortly. But the rush of capital into sugar refining will soon produce a competition amongst refiners that will spoil their profits. Freights will rise, neutralizing the bounties on export that tempted capital into refining. But capitalists are a great power in America (the refiners are all large capitalists) and they will now join with the landowners of exhausted lands in the Eastern and Southern States, the sugar chemists and machinists, in lobbying legislators to pass Acts of Congress to give Federal State aid to beetroot sugar growing and manufacturing, as has been done in France, Germany, and other European countries, and which has been one of the causes of the poverty of the people in them. England and

* The author of the articles on the Future of the British West Indies, in the *Sugar Cane*, 1882-83.

Ireland have tried beetroot sugar growing and making, several times during the last 40 years, and though our climate is as good as the North of France, Belgium, and Holland, and far superior to Denmark, where beet sugar is largely made, (and in the last-named country supplies almost the entire population,) we found it could not be done without adopting the ruinous continental means.

Our people and Government were too wise to regard the outcry the landowners and their dependents, and the chemists and others made about paying 20 millions for foreign sugar. They knew if they went in for protection or bounties they would have to pay 40 millions for their sugar, and they had rather have the 20 millions saved to invest in remunerative undertakings.* But America, unfortunately for her, is a protectionist country, though less so than she was, and we are greatly afraid if beetroot sugar imports and exports continue much longer as they are, that she will commit on a large scale the same folly that France and Germany have committed, to their dire impoverishment.

To show that these fears are well founded I give some extracts from the writings of one of the two great authorities in America on beet sugar; as far as I can learn they are Mr. Lewis S. Ware and Dr. Tucker, both of Philadelphia, that great city of beet; the former has written a large book of more than 300 pages, entitled "*The Sugar Beet*,"† and he is also the editor of a magazine, *The Sugar Beet*, and advertises himself an expert in beetroots, beet sugar, and other matters. Dr. Tucker is an analytical sugar chemist, and of him we shall have to speak shortly. Mr. Lewis S. Ware says in his preface, p. 2:—"There is nothing more delusive than mere prices as expressed in money of account. It may for instance, be economical to buy an article at a high price, when the circumstances attending the production of that article are such as to produce a market for one's own labour, while it is dear to buy it at a low price when the production of the article makes no demand for that labour." As if the United States were not wide, and a man could only labour at one thing in one place, and

* In my next paper, I shall speak more fully upon the efforts made in this country to produce beet sugar.

† *The Sugar Beet: Including a History of the Beet Sugar Industry in Europe.* By Lewis S. Ware, C.E., M.E., &c.; Member of the American Chemical Society. Philadelphia: Henry Carey Baird & Co. London: Sampson Low & Co. 1880.

other men should be made to pay, to find labour for him. Again, Mr. Ware says in the historical part of his book, speaking of the French Sugar Laws of 1847. . . . "The only rational law passed during this period was the prohibition of the importation of foreign refined sugars, and in this manner the French refiners were protected." Well, I cannot see the rationality of a law that would double the price of sugar to millions of the people for the sake of the few. I could give a number of extracts on a par with these two from Mr. Ware's book, if it were worth while.

Far better is it worth our while to look attentively on what has been the effect of beetroot sugar in Europe, and to bear in mind that such must be the effect in America, which has not the temptation that somewhat excuses the former quarter of the globe, as the United States have in Southern California and Florida as good sugar cane growing lands as the West Indies; in extent and fitness for cultivation, able to supply twice over the United States and Canada with cane sugar—sucrose—THE SUGAR.

For America to rush into sugar beet growing would be simple madness, as it would not only kill its splendid cane sugar States, but prevent its magnificent people from using a superior and wholesome sugar, and getting a health-giving treacle for their children, instead of their being poisoned by a mixture of beet molasses and glucose.

Respecting American refineries sending some of their out-turn to Britain, not only, I repeat, have Britons generally no objection to receiving the grocery sugars from New York refineries, but they are very glad to get them, because they are known to be sucrose, though in consequence of this they have to pay $\frac{1}{2}$ d. per pound retail more for them than for continental betose lumps, and Britons think it very self-denying of the Philadelphians to let us have this sugar and to use betose in its place. Many of the New York refineries will have none of this unclean thing, while the Philadelphian ones seem to revel in it.

From American sources I have not been able to meet with any definite information as to the imports of beet into their great refining ports of Philadelphia, Boston, and New York, but from European journals I find that for the last two years there have been large and continually increasing shipments, from the beet producing countries of Europe, to these three ports. No exact figures can be got, but as

far as can be ascertained, Philadelphia has taken more than half of all the beet sugar shipped to the States from Europe. But she refines less than two-thirds of what Boston does, and only one-seventh of what New York refines, so that it seems probable Philadelphia refines at least half the beet imported. Therefore it is not surprising that one of the two great authorities on sugar in the States should have become somewhat excited—after transferring his valuable services from New York, the city of cane, to Philadelphia, the city of beet—to find it declared in this journal by “an unknown author” that beet sugar is inferior to cane sugar. I believe Dr. Tucker, now of Philadelphia, late of New York, to be an authority on sugar matters, for three reasons—1stly, I have his book, “A Manual of Sugar Analysis,”* the preface is dated from New York, which we venture to state is a valuable work; more especially as it is favourably reviewed in the *Sugar Cane* of June, 1882, p. 322. 2ndly, I have also read a letter, dated from New York, of Dr. Tucker’s to the *Chemical News*, reprinted in the *Sugar Cane*, October, 1882, p. 541, on “Sugar Analysis,” which doubtless is a valuable contribution on that subject. 3rdly, I have by the favour of the Editor, read his letter to him,† to be published in this month’s magazine, which most convincingly demonstrates him to be an authority; in it he speaks as “one having authority,” even the manner of “his speech bewrayeth him” as one. His brevity and accentuation both denote it—less than a score of lines made up of affirmation, denunciation, warning, and calling upon great names—show the true sacerdotal style of letter.


The poor Author denounced in it directly, I hope may survive. As to myself I am ingeniously demolished indirectly, and I am more hurt than if Dr. Tucker had done it ingeniously, because he makes out that I am the cause of the poor author’s offence, as he says his statements are “mere copies” of an article of mine, and goes on on to say, “I desire to protest against the publication of such matter.” Well I venture to assure the Editor that I think the Doctor “does protest too much;” at any rate, with his permission, I shall take some pains to try and show him, and the other readers of the *Sugar Cane*, that such is the case. I beg also to assure Dr. Tucker that the poor Author’s statements are not “mere copies” of

* A Manual of Sugar Analysis. By J. H. Tucker, Ph. D. D. Van Nostrand, New York, 1881.

† For Dr. Tucker’s letters see page 386.

ERRATUM.

Page 344, 12 lines from the bottom, for
“ingeniously” read “ingenuously.”



one of my articles, as will be clear to him on reperusal, or to anybody that reads the two articles in question; but if they should read mine, and my seven previous articles,* forming a series in the *Sugar Cane*, commencing in July, 1882, they would perceive that much of what I said is similar in import to much the author in question has stated. But that by no means goes to show "his statements are mere copies" of one or half a dozen. They repeat the sum of what I wrote between two and three years ago, and what many other people have written at divers times. The Author in question does not, as I did, produce my evidence in support of the facts stated, nor give quotations as I gave them, from the highest contemporary authorities, and gives no references in support of his assertions, and therein I think he was remiss; but are Dr. Tucker's assertions any better supported if he names four authorities whom we are to suppose stated that pure beet and cane, and a mixture of the two, all polarised alike. Well, suppose they did; how does that affect the contention? The attacked Author's main assertion was, that beet sugar was inferior in sweetening power to cane sugar; and therefore, as they polarised alike, or nearly alike, the polarimeter, or polariscope, was not an instrument for testing the sweetness of sugar. This is the pot calling the kettle! This is the true sacerdotalist's way of professing to discuss "important matters"—naming authorities on a question who are no authorities on the matter in question, who have never expressed any opinion on the point—who are simply polariscopists, according to Dr. Tucker's own statement respecting them.

Dr. Tucker has ventured to protest against the Editor publishing the article that offends him, and that emboldens me to remark that I think it is evident that Dr. Tucker's letter is better fitted, by its dogmatic diction, for a theological than a technological journal.

Before leaving this small matter, of which I fear I have said too much already, I must, in justice to the author of the article (in the *Sugar Cane* for April, 1885, p. 194) attacked, state that he quoted Chaptal very much to the point (and of whom I shall have to say much hereafter), whom I had not quoted, and he suggested the use of a "glycometer or measurer of sweetness," and mentioned several matters in his article which escaped my attention in writing my series

* See *Sugar Cane* for 1882, pages 343, 349, 460, 511, 628; and for 1883, pages 7, 69, 116.

of papers. And with regard to these papers, as it is between two and three years since the last appeared, and just three years since the first came out, I shall in the course of these papers repeat some of the evidence, as I consider the present an opportune time, especially for Americans, to weigh it, and fresh evidence that I shall bring forward, both from our later chemists and our earlier, as to the relations of beet to cane sugar, but especially the later, over whom a great change has come latterly.

The dogma of Mr. Ware and Dr. Tucker is, that refined beet-root sugar and refined cane sugar are identical in every respect, and it is the dogma of hundreds of French and German chemists, most of whom dare not entertain any other at this day, any more than they dared to do in Napoleon 1st and Chaptal's time, who were the founders of the beet-root religion and the promulgators of the foregoing dogma.

Dr. Tucker says in his preface (p. 1) that he derives his creed mainly from French and German sources. Mr. Ware says the same, and he keeps on repeating from time to time in *The Sugar Beet* his dogma, just as some people repeat the Apostle's Creed in Church.

To convince credulous people of the fallacy of their belief you must sap it at its source, undermine the primal authority; and this I shall attempt.

I shall first give a short narrative of the rise and progress of the beetroot industry on the Continent of Europe, in order to show the cause of its rise and the course of its progress; as in doing this one will be better able to appreciate the strong bias of the German and French chemical authorities, in stating that beetroot sugar was equal to cane sugar, and also in order to ascertain whether the statement partakes of the nature of a creed or dogma, or is founded on well-ascertained facts, or whether, like every dogmatic creed, it was derived from the surroundings, the desires, and the hopes of those that promulgated it, and has been handed down from father to son—from generation to generation—without any inquiry as to its derivation. And then I shall shortly touch on the attempts in England and Ireland, and in the United States and Canada, to manufacture beetroot sugar, and shall consider the reasons put forward by the persons who attempted to establish this industry in these countries for making their attempts, that we may see if they are valid ones, and whether the beetroot sugar industry has any possibility of a co-existence with a free international exchange of commodities.

Unenlightened Prussian patriotism brought beetroot sugar into being. Prussia had long begrudged the money she had to pay her neighbours for her sugar, and more especially did she begrudge France the specie she got for the sugars from her splendid colony of Hayti; whence, in the middle of the last century, was obtained more than half of the sugar consumed in Europe. The Prussians fancied, as all unenlightened people fancy, that the money paid for their sugar was to the enrichment of the foreigners, and the impoverishment of themselves; and having induced their chemists to turn their attention to the extraction of sugar from roots and fruits, where, of course, it had been known to exist as long as they and humanity had existed, Marggraf, a Prussian chemist, in 1747, obtained from the beetroot a crystallized sugar. He and his countrymen were delighted—naturally, but as they found they could only get less than one-half the quantity of sugar out of beetroot juice that was obtained out of cane juice, they let the matter drop, and there it lay for a quarter of a century; but in 1773, Achard, a chemist, of Berlin, encouraged by Frederick the Great, took it up again and made a series of experiments, which, however, resulted in nothing, as his great patron, inopportunately, died. Beetroot sugar-making was again abandoned for above twenty years; but now, when sugar had become very dear from the wars with England, and the revolt of Hayti, Achard, in 1795, resumed his inquiries, and in 1796 the first beetroot sugar factory was established at Cumoon, in Silesia, by Achard and Hermstadt. "They succeeded on a sufficiently large scale in obtaining from beetroot about 6 per cent. of crystallized sugar and 4 per cent. of molasses," says the eminent chemist, Mr. Crookes, in his book "On the Manufacture of Beetroot Sugar," p. 2*. Very speedily this beetroot sugar factory collapsed; sugar beetroot advocates do not tell you clearly why it did so. Mr. Arnold Baruchson, in his book on "Beetroot Sugar, p. 7., † speaking of the report of a Commission appointed by the Institute of France, in which they stated they obtained only "a little over one per cent." from the beetroots they experimented on, mentions

* "On the Manufacture of Beetroot Sugar in England and Ireland." By William Crookes, F.R.S., &c. London: Longman, Green, & Co. 1870.

† "Beetroot Sugar. Remarks upon the Advantages derivable from its Growth and Manufacture in the United Kingdom. Together with a Description of the Rise, Progress, and Present Position of that Industry on the Continent of Europe," &c., &c. By Arnold Baruchson. London: Effingham and Wilson. Liverpool: Webb, Hunt, and Ridings. 1868.

incidentally that "the failure of Achard's manufactory" arose from "the fatal mistake of boiling the root before he pressed it." But as Mr. Crookes says nothing of this, and as he was well acquainted with Mr. Baruchson's book, for he frequently quotes it in his work, this cannot have been the cause of his failure, more especially as Mr. Crookes is an eminent chemist, not simply a sugar chemist, though he understood everything about sugar both chemically and technically, and as Mr. Baruchson was, or had been, a Liverpool merchant, it is easy to determine the value of his statement. More especially as Achard got as much sugar from his beets as are got at this day, according to Mr. Crookes, who was advocating in his work the cultivation of the sugar beet in England and Ireland, and would undoubtedly have accounted for the Achard and Hermstadt failure in Silesia in the way Mr. Baruchson has done, if he could have done so truthfully. This is only a sample of the bulk of Mr. Baruchson's book.

Achard had published a pamphlet to enable him to start his factory in 1796, just as Mr. Baruchson did in 1868 to enable him to get up a company. He does not say so in it, but it is perfectly well known that such was the case, and that a gentleman in Liverpool who had been his partner took a most active part in trying to float it, and I saw a prospectus of it at the time with Mr. Baruchson's name,—as a provisional director. Fortunately the shares were not taken up.

In this pamphlet of Achard's the beetroot was made to appear as a regular providence both to man and beast—sugar and tobacco for the one, pulp and leaves for the other—as he says the leaves will make a good substitute for tobacco, and one must believe it is used in its place to this day in Germany,* for the cigars and tobacco one gets there take the skin off one's mouth, which you would naturally expect sugar beet leaves to do, as it is well known that they

* From *The Sugar Beet* of Philadelphia, April, 1880. Lewis S. Ware, Editor.

BEETROOT LEAF TOBACCO.

It is said that in Thuringia, Germany, over one thousand tons of dried beetroot leaves are annually passed off as genuine tobacco. The same leaves, as well as those of chicory and cabbage, are largely used for a similar purpose in Magdeburg and in the Palatinate. The "Vesey" cigars, so much favoured in South Germany, contain no tobacco leaf at all, but are composed of cabbage and beet leaves, deprived of their natural taste by a special form of cultivation, and subsequently steeped in tobacco water for a lengthened period.—*The Journal of Applied Science*.

contain some four per cent. of oxalic acid.* This statement of Achard is quoted both in Mr. Crookes' book, p. 3, and in Mr. Baruchson's book, p. 6, quite seriously, and we do not see why if a man has persuaded himself that beetroot sugar is equal to cane sugar, he should not persuade himself as readily that beetroot leaves are a good substitute for tobacco-plant leaves. It is all a matter of taste and mucuous membrane.

Achard in 1799 cut his pamphlet up into a series of letters to a French chemical paper. As at this time, sugar was very scarce in France, they made a great sensation there. The Parisian and provincial journals gave full extracts from them and they attracted universal attention; more especially, as the French could not be induced to believe that dextrose sugars, made from grapes in the south of France, were proper sugars, as they did not crystallize anything like cane sugar, while beetroot sugar had a resemblance to cane crystals.

By the French, Achard was considered as a deliverer from the dearth and consequent dearness of sugar that prevailed at that time, as well as from England's commercial monopoly and maritime supremacy.

Achard asserted that a kilogramme of brown sugar, equal to low Muscovado sugar, could be sold for 65 centimes, or 3d. a lb., and as the latter was then fetching in Paris 2s. a lb. the incentive to enter upon beetroot sugar-making was enormous. More especially if the manipulations of the root were improved upon, and the waste products from it were utilized, the price might still further be lowered. Such important statements by, apparently, such a good authority could not be neglected.

The French people had been in great straits for sugar for many years in consequence of the war with the British, which had begun in 1793, and during its continuance they had captured Guadeloupe and Martinique. Supplies of sugar from Hayti were also cut off, as this grand colony had revolted.

Consequent upon this scarcity of sugar, French chemists had

* Referring to the beetroot, a writer in *Knowledge* says: "The fresh leaves contain about four per cent. of oxalic acid, about a third of which exists in a soluble form. It will now be seen why I said it was not advisable to feed cattle entirely on the fresh leaves, as the acid induces inflammation of the mucuous membrane of the stomach."—See the *Sugar Cane*, vol. xv., (September, 1883,) p. 473.

obtained it from the grape, and in the south of France a large number of factories had been established with State assistance—in which many chemists of note were interested; and these celebrated chemists do not seem to have been anxious to turn to a better source for a sugar supply, for when a Commission was appointed by the Institute to test the truth of Achard's statements consisting of Sels, Chaptal, Parmentier, and seven other celebrated chemists, they reported against him. They stated that 25 tons of beetroots only yielded $4\frac{1}{2}$ cwts. of white Cassonade (raw beetroot sugar), or less than one per cent. The public, as it is apt to do, got hold of the wrong animal by the ear, and declared Achard a deceiver. This declaration was the more readily acquiesced in, as Parmentier stated that grape sugar was nearly as sweet as cane sugar, and as the French wines were now cut off from their chief customers, the English people, and they and Napoleon had cut off their supply of sugar, what better could they do than make sugar from their grapes?

Dr. Tucker tells us in his book, "A Manual of Sugar Analysis," page 10, what Parmentier has recorded about grape sugar-dextrose:—
 "The relative sweetening power of cane sugar to dextrose has been
 "generally placed as two to one.* Parmentier questions this, and
 "gives the following quantities of the two sugars as having an identical
 "sweetening effect":—

10 pts. of cane sugar to 40 pts. of water.

12 „ dextrose to 40 „ „

Napoleon was obliged to continue dealing out dextrose to his people for some time longer, though they could not be persuaded that it was nearly as sweet as cane sugar, as the chemists tried to persuade them it was, and finally becoming altogether dissatisfied with it, dextrose had finally to be abandoned, and betose, (the saccharine extract of beet,) a decidedly better sugar, brought into the field again. Chaptal, the celebrated chemist, Minister of the Interior under Napoleon I., recommended him to make sugar from beetroot, and he deputed Chaptal, Delisse, Benjamin Delessert, Barruel, Isnard, and other chemists of eminence, to make sugar out of beetroot at any cost.

To be continued.

* All authorities of the present and preceeding days (except sugar chemists of the Napoleonic era, and a few American chemists,) Liebig, Drs. Ure Turner, Gregory, Muspratt, Miller, &c., make it $2\frac{1}{2}$ to 1.

UNITED STATES BOUNTY ON EXPORTATION OF
REFINED SUGAR.

LETTER FROM THE BRITISH REFINERS' COMMITTEE TO THE
BOARD OF TRADE.

9, Mincing Lane, 1st June, 1885.

The RIGHT HON. J. CHAMBERLAIN, M.P., President of the
Board of Trade.

Sir,—I am desired to bring to your notice a report which has appeared in the American papers to the effect that a commission has been appointed by the Secretary of the United States Treasury to inquire into the drawbacks given to the American Refiners upon sugar exported.

Bradstreet's Journal, in commenting on the news, says:—"It is generally admitted that the present drawback upon hard sugar is equal to a bonus of 50 cents per 100lbs. As this amount comes out of the Treasury, the Refiners have been exporting sugar at the country's expense. Last year over 50,000 tons were exported, which, at the present rate of drawback, cost the Treasury \$500,000. Already this year nearly \$180,000 have been paid out in subsidies to our Refiners. The appointment of the commission comes none too soon, and it is to be hoped that the investigation will result in instituting more equitable rates."

I am desired to request that this may be communicated to Her Majesty's Minister at Washington with the view of his again communicating to the present Government of the United States, for the information of the commission, the memorandum with which I furnished you on the 13th July and 23rd August, 1883, showing the present excess in the drawback and the amount at which it ought to stand.

I am also desired to call your attention, and that of our Minister at Washington, to the following extracts from American papers on this subject.

The review of the sugar trade of the United States for 1884, which appeared in the New York commercial papers in January, says:—"One of the most notable features of the operations of the year has been the large exports of refined, aggregating 63,643 tons, the bulk of which has been shipped from the port of New York. The increase compared with last year, which aggregates over 50,000 tons, has been mainly shipments made to Great Britain, where the product of our refineries has found ready sale and successfully competed with the output of British refineries. *This has been possible, however, solely in consequence of the drawback allowed to exporters under the present tariff law, which is tantamount to a bounty, and has given our refined product an advantage which it could not have obtained otherwise in a country where sugar is admitted free of duty.*"

In another part of the same report the following passage occurs:—
 “It is worthy of remark in this connection that the British refineries have been almost swamped by the flood of supplies that the payment of a government bounty upon exports has made it possible for this country as well as Europe to divert thither.”

The New York Price Current, of April 8th, says:—“For some time past the value of refined sugar has been maintained almost wholly by the export demand for granulated, which is profitable to refiners because of the drawback allowance which the Government makes, and which in reality amounts to a bounty estimated at about 50 cents per 100 pounds. For the first three months of the current year the total exports aggregate over 20,000 tons, against about 4,500 tons for the same period last year, the bulk of which has been absorbed by Great Britain, where by reason of this bounty system our product has been enabled to compete successfully with the output of British refineries.”

These statements, from independent American sources, are a good reply to your inquiry whether there are other circumstances, besides the bounty, which would help to account for the large importation of sugar from the United States.

As to freights, I find that they have varied greatly since the time when the bounty came into operation and the large exports commenced. They have been sometimes high and sometimes low, but the amount of sugar sent has continued to be equally large under either condition. But it is unnecessary to seek for other causes, a bounty of two shillings per hundred weight being quite sufficient to enable a sugar refiner to under-sell all competitors who receive no such advantage. The excessive shipments commenced with the bounty, just as on the former occasion they commenced and ended with it.

The British refiners are being sadly harassed and distressed by this continuous and increasing competition, the American refined sugar being sold considerably below the price at which it can be produced.

The increase in the importations into the United Kingdom of American refined sugar is as follows:—

	Tons.
Average Monthly Imports, 1882	195
“ “ 1883	520
“ “ 1884	4,348
“ “ 1885	7,147
Imports for the month of April, 1885	12,957

I am, Sir,

Your obedient servant,

(Signed) JAMES DUNCAN,

Chairman, British Sugar Refiners' Committee.

NEW COMMERCIAL PLANTS AND DRUGS.*

During the past six years there has appeared occasionally a publication, in pamphlet form, by Mr. Thomas Christy, F.L.S., entitled "New Commercial Plants and Drugs," the object of which is to bring more prominently before the general public, but especially before those most interested in the growth of new commercial vegetable products, various plants and their extracts hitherto unknown or at best only locally known. The object is of such exceeding utility that we ought before this to have given some notice of the work, but its appearance being somewhat irregular, it scarcely seemed to form part of a definite series, though it was evident that it would meet a want, and hence eventually become a regular publication. Though this desirable stage has perhaps scarcely yet been attained, the severe depression from which many of our colonies are suffering render it a duty as well as a pleasure to call the attention of our numerous readers to this remarkably useful work, the steadily increasing size and more frequent appearance of which prove the correctness of our anticipation that it would create a demand for itself. Planters and owners of estates in our colonies must indeed welcome every opportunity, not only of becoming acquainted with new plants which are likely to have a commercial value, but of obtaining the requisite seeds and slips for propagation, together with instructions as to the habitat and manner of growth, and the future prospects of the products to be derived from the plants. Such a desideratum seems really to be supplied by the work in question. The editor is a practical man, in constant communication with every part of the globe where useful natural productions are found, and appears to possess the proper scientific as well as commercial qualifications for the work. That he has taken it up in the proper spirit is indicated by one of the opening sentences of the last number, which reached us last month: "One of my aims has been to place myself in working connection with scientific investigators, and the result of such connections has been one not merely of monetary advantage, but the promotion of a mutual interest which has, by a necessary reaction, had its favourable influence on

* "New Commercial Plants and Drugs," Nos. 1 to 8. By Thomas Christy, M.S.C.I. London: Christy & Co, 155, Fenchurch Street, E.C. 1882-1885.

“the progress of research.” Those who are looking about to find some more remunerative employment for their lands and capital than sugar cultivation at present affords (and the number of these is probably greater than some might imagine) may, we believe, with all confidence avail themselves of the information afforded by this publication, which is likely to be issued shortly at regular intervals. Indeed, as we read one page after another and see the enormous quantity of natural productions, the utility of which can be so greatly increased by intelligent cultivation on properly-prepared soils, and learn how valuable products, such as indiarubber and guttapercha, are (in face of increasing demand) becoming more and more scarce, owing to careless and destructive methods of collecting them in the wild state, or the unscientific modes of cultivation hitherto employed, we cannot help feeling that the want of intelligent, organised communication between different countries (more especially tropical) and defective experience on the part of those who have tried to find new commercial openings in this direction, have been a great loss to a hardly-pressed part of the mercantile community—we mean planters and their immediate associates, the Colonial merchant and his agents—and that such a publication as this has not appeared a moment too soon. And as regards remarkable drugs, the properties of which have as yet been only locally and imperfectly known, it seems that on the ground of the mitigation of human suffering alone Mr. Christy's work is a necessity. It is quite delightful to read of a drug which bids fair to become a specific for that curse of Englishmen, rheumatism and neuralgic affections, and of many others, the effect of which in some cases appears to have been almost magic in disorders of the gravest description. Information of the most reliable character, as far as outsiders like ourselves are able to judge, is given with regard to the properties of these drugs, the habits of the plants, and the present and possible commercial value.

As, however, our readers are mainly interested in those plants which it would pay to cultivate on large estates, we will confine our subsequent remarks to this point, which indeed forms a leading feature in “New Commercial Plants and Drugs.”

Of all the products of the vegetable kingdom which are now being brought into commercial use, it seems that various fibres susceptible of being spun and woven into fabrics, especially the finer sorts, are most likely to interest our friends in the Colonies. To this

class the editor of the work before us is now devoting especial attention, and we propose to give a short summary of his remarks, which are far too extensive to be inserted at length.

It is well known that the great objection to those varieties of fibre known collectively as China grass has been their brittle nature and comparative harshness, and this alone has prevented them from becoming formidable rivals to cotton, linen, and even silk. Microscopic investigation has shown that this resulted from the fact of the cellulose matter which composed them being encrusted with ligneous or woody matter, and the problem was how to get rid of this and yet retain sufficient tenacity and toughness in the fibres. It was suggested that boiling under pressure would effect this, but great difficulties were met with, until Mr. C. D. Ekman invented a process which consists in subjecting the fibrous matter to such boiling in water containing sulphurous acid more or less in combination with a magnesia base, the proportions being regulated by the density and composition of the raw materials, and the extent to which it is necessary to remove the encrusting matters.

We may here remark that the probability of any fibre taking the place of wood pulp in paper-making may be looked on as reduced to a minimum, the above-mentioned process having resulted in rendering wood pulp so completely applicable for this purpose that it may be expected to almost entirely oust esparto grass, the relative cost of the dry cellulose being from wood pulp £4 3s. 4d., and from esparto £15 15s. per ton. We quote from No. 6 of the work under review, published 1882:—

“People living abroad must bear in mind the fact that almost the highest price that can be obtained for a paper pulp in this country is £20 per ton, without any of the short stuff or filling in it, whereas for a fibre for spinning into cloth no limit can be placed upon the price, for the simple reason that any good fibre which would turn out a beautiful cloth, similar to the *hand made cloths from the Philippines*, would fetch a price equal to silk.”

The cloth here alluded to as being made in the Philippines is the celebrated pine-apple cloth made from the *ananas sativa*, or pine-apple.

“When preparing this fibre the leaves must be manipulated in the ‘green state, as nothing can be done with them when dry. The ‘leaves are laid on a board, and the epidermis removed with a broad ‘knife. Although the fibres are very fine the process of bleaching

“renders them so much finer that they can be spun like flax. It is claimed that constant immersion in water does not in the least injure it.”

This last property is a valuable one, for one great objection to the various forms of *jute* fibre is that they are liable to become quite rotten if subjected to even occasional wetting.

It seems very evident that the attention of planters should be turned to the production of such fibres as can be employed in the spinning of yarns for weaving dress fabrics and possibly taking the place of the finer polished cotton yarns which have for some years been so much in use. As to the possibility of producing certain fabrics, even with the limited knowledge as yet possessed, there can be no doubt. We have within the last few days inspected sundry articles woven from Rhea yarns, and a comparison with what had formerly been produced in this way shows the immense progress already attained, and convinces us that there is a great future for this class of fibres. It was stated lately, in London, at a meeting of the Society of Arts, that at £30 a ton there was practically no limit to the quantity of Rhea fibre that could be sold, and at £35 a large quantity could be got through. This is, of course, in the present stage of industrial knowledge with regard to the applicability of the fibre; our own impression is that greater experience may be expected to lead to a development at present scarcely foreseen.

The question may almost be called a burning one, for at the moment of writing a newspaper correspondence is being carried on from which we learn that the Rhea or Ramie fibre or China grass (from the *Boehmeria nivea*, a plant of the Urticaceæ or nettle family) which has hitherto attracted the greatest attention, and at present offers the most immediate prospects of success, is already in such demand that an order which has been placed in London cannot be executed until more supply comes forward. The following is an extract from one of these letters, which, after premising that “this industry (the growth and production of China grass from the Rhea plant) has passed the stage of experiment, so far as planting it is concerned,” goes on to say:—

“An order was recently placed here for 1,000 tons of the fibre, treated by the English process, but the order cannot be executed till some of the crops now being cultivated are to hand. Estimating half a ton of fibre to the acre, this would absorb the produce of about 2,000 acres; whereas, as far as

is known by those in the trade, there are not 1,000 acres under cultivation for rhea at the present moment anywhere."

Some correspondence in No. 7 of "New Commercial Plants and Drugs" tends to show that it has been settled that the plant in question can be grown as well at the level of the sea as on the hills.

There appear to be two methods of treatment for preparing the fibre, (which, by the way, is receiving great attention in France just now), the one is known as hand preparation, the other as the English method; by means of a machine, one of which (the best apparently) known as Smith's machine, is figured on page 33 of No. 7 of this publication and seems to be of very simple construction. Some authorities think that a good deal has yet to be done before the fibre can be considered as quite what is wanted, and that some chemical process is absolutely required for subsequently preparing the raw fibre, however obtained. All agree that the first process must be performed while the plant is green. To one of these chemical processes we have already alluded in an extract from the work under review, another is mentioned in the last number of "New Commercial Plants and Drugs", which "consists in heating the plants or fibrous substances under pressure with a solution of thiolyte. The operation may be performed in an iron boiler of any convenient construction by simply passing live steam direct from the steam generator. The pressure necessary depending so much on the nature of the material and the quality of the product required, it is difficult to give precise information on this point. In the case of China grass the fibres should, after being washed, be soaked for about half an hour in dilute acid in a stone or wood vessel. Thiolyte can be used in an iron boiler or converter, into which steam may be blown directly. By a simple contrivance the liquor can be recovered and much of it used over again."

This process is recommended by two facts—firstly, that it requires no very special apparatus; and secondly, the economy in the necessary chemical substance. This plant, the *Boehmeria nivea*, has been cultivated in Upper India, where it is known as "rhea", from time immemorial; it is also known in Sumatra, China, and Japan. Another variety, the fibre of which is said to be exceedingly strong and fine, is the *Urtica gigas*, a native of Australia, rising from 25ft. to 50ft., and sometimes even 120ft. Another, *Urtica heterophylla*, a native of Assam, supplies extremely long silky fibres, and a specimen

of the cleaned fibre lately brought to London was valued at £125 per ton. The seeds are said to vegetate quickly, and the cultivation of the plant to be possible to any extent.

Besides the Rhea or Ramie, a long list of fibre-producing plants, a considerable number of them being suitable for culture in tropical climates, is given by the work under review. Of these we may name *Pandanus vacuo*, from which the natives of Mauritius are said to produce a fine elastic cloth, which has not been as yet fully examined in this country, but would probably become valuable if treated by the chemical processes; *Agave Sisalana*, Mexican grass or Sisal hemp, or grass hemp. It is called Caballa in Central America, and Losquil Henequen in Yucatan, where it is estimated that a capital of over £1,000,000 is invested in this industry. It is mainly used for cordage, but under the new processes may probably furnish a very fine silky fibre for much higher purposes. The fibre of young bamboo has also been made available, hitherto mainly for paper-making. *Musa paradisaica*, the edible plantain, is being cultivated, we believe, in Jamaica, and with proper capital and plant it is estimated that 18 tons of fibre can be produced on $5\frac{1}{2}$ acres at a cost of £174 = £9 8s. per ton. It is thought that this cost could be reduced by one-half. There seems no doubt that a very considerable opening is presenting itself in this direction. The demand for the finer varieties of China grass, when once the difficulties have been overcome—and really they seem to be all but overcome—would become enormous, as there is no reasonable limit to the use of this fibre for dress fabrics and half-silk goods. One thing seems certain, viz., that it would be necessary to prepare the fibre for the European market while it is fresh, as experience up to now goes to prove that fibre prepared from dried vegetable matter is inferior, besides being more difficult to prepare; even were it not so, the enormous cost of shipping the raw material would probably necessitate previous preparation.

There is another vegetable production referred to in "New Commercial Plants and Drugs" to which, in the interests of our readers, we feel compelled to call attention: it is the Kola nut, which, though hitherto supposed to be only a drug, is evidently about to become a valuable food supply. We quote from No. 8 of this publication: "I have now to record one of the most important discoveries that has yet been made with the nut of *Sterculia acuminata*, viz., that these nuts can be prepared by a special process and made into a paste

“that could not be distinguished from fine cocoa paste.” The results of the tests applied are worth mentioning;—

“If Kola paste is mixed with cocoa, it gives a chocolate of a finer quality than Caraccas; if mixed with three parts of a low class cocoa, it improves the latter, both in strength and flavour, to an astonishing degree. Chocolate made with Kola paste is ten times more nutritious than that made with cocoa, and one of my correspondents writes me that his family and many of his friends have taken the Kola chocolate and found it very strengthening, the flavour pleasant, and that they have used it more than a year. Kola chocolate is so nutritious that a workman can, on a single cup taken at breakfast time, go on with his work throughout the day without feeling fatigued; little appetite is felt for the mid-day meal, showing that the well-known sustaining properties of the nut are retained in the paste.” Another extract must suffice;—

“I strongly advise planters in our colonies, who have low damp lands, to cultivate this very important tree, for they will find the demand increase year by year for this product. It is much more easily cultivated than ordinary cocoa, and yields a large crop twice a year; it does well in low steamy lands, and gives large crops of fruit in some of our West India Islands.”

It is extremely probable that we shall return to the question of the Rhea and similar fibres in a short time. Meanwhile we think we fulfil a duty in bringing the publication of Mr. Christy under the notice of our readers.

DEPRECIATION IN THE VALUE OF LAND IN ENGLAND.

The value of land in England still continues to fall. “A few days ago,” says the *Land Agents’ Record*. “an estate of some 500 acres in Cambridgeshire was exposed for sale, but only £22,500 was offered. A few years ago the same property changed hands for £70,000. Much of the land on another Cambridgeshire estate is said to be let at 3s. an acre to prevent it from going out of cultivation.”

THE CONFECTIONERY TRADE AND THE SUGAR BOUNTIES.

The following correspondence has recently appeared in the *Pall Mall Gazette*, between Messrs. Clark, Nickolls, and Coombs, of the Hackney Wick Confectionery Works, and the Secretary of the Workmen's National Association for the Abolition of the Foreign Sugar Bounties :—

"We see," write Messrs. Clark, Nickolls, and Coombs, "the sugar bounty agitators are again fishing in the troubled political waters, if haply they may obtain something by the change of Government. The continental bounty system is no doubt anomalous, but it is not the fact that it has injured the sugar refining industry here. Any one acquainted with the trade knows that more sugar is refined in this country now than at any former period. Being duty free the raw sugar used by refiners, and *foreign refined sugar used by confectioners*, can now be landed direct at buyers' waterside factories, and wharf charges for such labour is avoided. Owing to this saving of expenses, confectioners especially are placed in a position to compete and secure a share of export trade; and, as shown by Board of Trade returns, that trade of late years has greatly developed. *The foreign bounty is supposed to be two shillings per cwt., but if a duty were put on sugar to "countervail" it, this would simply annihilate the confectionery export trade, as although there would be allowed a drawback equivalent to the sugar duty on the goods exported, confectioners would be out of pocket for landing at wharves, delivery charges, customs charges, and red tape entries, inwards and outwards, amounting to at least another 2s. per cwt. as the quantities exported are individually small, and entries would be extremely numerous. We doubt if any Chancellor of the Exchequer would allow double the import duty as drawback to "countervail" these unnecessary charges. Considering that the confectionery trade employs at least ten times as many workers as sugar refining (even if injured, which we deny), and that the public benefit by cheap sugar, we hope a reimposition of the sugar duties will not be attempted by the new Government. If it is, the confectioners, who are a much more numerous body than the sugar bounty agitators, must start a counter-agitation if clamour and noise are to win the day."*

To the foregoing, Mr. Samuel Peters, Secretary of the Workmen's Committee, replies: "Suppose these foreign bounties were more than countervailed in their entire abolition by the Governments which give them, then, according to Messrs. Clark, Nickolls, and Coombs, their export trade is done for. We anti-sugar bounty agitators have never, as your correspondents suggest, sought the reimposition of the sugar duties. On the contrary, we should protest and agitate, if necessary, against any such additional burden upon the British home and colonial sugar industry. All that we ask, and expect sooner or later to get, is either the abolition of or a tax upon foreign export bounties. Such a tax would ensure supplies of duty free, because bounty free, sugar from every part of the world, by removing State protection of the most hostile kind from operating on British markets in favour of certain foreign labour and against the labour of the British Empire. From what I have heard the foreign bounty system has crushed out so much natural and healthy competition that the price of sugar will rise this year to an unprecedented height. The imposition of a countervailing duty upon all bounty-fed sugar,

and the certainty of its maintenance until bounties were abolished, would have done more to secure the natural level of price than leaving bounties unchecked in their arbitrary operation on our markets. We insist that bounties are a gross violation of free trade—cause violent fluctuations in price, destroy confidence, to the detriment of British labour in a most important industry, and turn legitimate trading into an unsound and dangerous speculation for great falls and rises in the price of sugar. In spite of your correspondent's threats of a counter agitation, we shall continue our agitation among the working classes against all foreign bounties until their abolition is secured."

THE GOVERNMENT AND THE SUGAR BOUNTIES.

A special council meeting of the delegates of the working classes engaged in the British home and colonial-sugar industries was held on June 24, at the central committee-room of the Workmen's National Association for the Abolition of the Foreign Sugar Bounties, Leman-street, Whitechapel, to discuss the probability of the New Government releasing British and Colonial labour from the competition of foreign state bounties. Amongst the interests represented were the following:—The East London, Bristol, Plymouth, Scottish, Liverpool, and Manchester sugar operatives; the dock and riverside labourers of the Port of London, of Bristol, Greenock, Glasgow, Liverpool, Hull, Leith, Dundee, Exeter, Plymouth, Cardiff, Swansea, and other ports. The sugar engineers of Derby, Wallingham, Norwich, Liverpool, Glasgow, and other towns wrote letters strongly sympathising with the movement. Letters were read from Lord Randolph Churchill and many other public men, urging the desirability of settling the foreign export bounty question both for revenue and for trade purposes at this juncture in the economic affairs of the nation. After a discussion among the delegates, which lasted three hours, the following resolution was adopted:—

"That we, the delegates of the labour interests involved in the maintenance and prosperity of the British home and colonial sugar trade—bound up as it is with the success of our colonial empire, respectfully request the most Honourable the Marquess of Salisbury and Sir Michael Hicks-Beach, to receive at their earliest convenience a national deputation of working men to represent to them the ever-increasing evil effects of this foreign system of exported protection, and to earnestly request them, both for the purposes of revenue and trade, to place a countervailing duty of one farthing per pound against all bounty-fed sugar entering the ports of the United Kingdom, in the interests of free trade to all sugar-producers throughout the world and State protection to none."

Delegates were appointed to visit the provincial centres, and, after arrangements had been made to hold a mass meeting in the East-end of London on the subject, the meeting adjourned.

THE SUGAR INDUSTRY IN RUSSIA.

Condensed from the *Journal des Fabricants*, 15th April, 1885.

The manufacture of sugar in Russia was begun in 1803, and appears to have proved so remunerative, that in 1820 the number of works had already reached 38, whilst in 1852 they had increased to 380, and ten years later, in 1862, there were 407, of which, however, 108 were not then working, and only 179 possessed steam power. In 1872 the number was 322, 86 of which were not working, 219 being driven by steam. In the year 1883-84 there were 244 factories at work.

From 1860 the numbers decreased, but the average turn-out increased; for the total production, which in 1860 was 25,000 tons, exceeded, in 1883-84, 300,000 tons. The diminution of the number of works was caused by a progressive increase in the excise duties. The smaller factories, badly fitted up, were unable to compete with the larger works possessing improved plant. The same thing happened all over Europe.

Russian sugar had always been protected by import duties. In 1825 imported sugar paid about 24s. 6d. per cwt.; in 1831 this was raised to 31s. 2d. per cwt. In 1841 there was a further advance to 37s. 4d. per cwt.

In 1848, the imports being seriously reduced by the rapid and continued increase of the home production, the Government was compelled to make good the deficiency by levying a duty of 3s. 9d. per cwt., the quantity of raw material worked up being taken as a basis for estimating the sugar produced, and the calculation being made in the same manner as is now in force in Austria, with the peculiarity of there being three zones of production fixed, the proportion of sugar yield being different in each, and the mode of extraction of the juice being also taken into consideration.

In 1867 the excise duty was fixed at about 3s. 2d. per cwt. of sugar up to August 1st, 1870. A rough calculation has shown that by resorting to improved methods of extraction, etc., the excess obtained over and above the quantity on which duty was levied was so large, that in a fair-sized factory the extra profits gained in this manner amounted to £2,000 in one season.

Under these circumstances it is not surprising that the manufacture of sugar underwent a rapid development, rising from 60,000 tons in

1864 to 175,000 tons in 1871, and finally overtook the consumption, so that in 1872 the Russian Government was obliged to raise the drawback on export to avoid a crisis. The results obtained were, however, not satisfactory, and after various experiments it was decided, in 1880, to levy a progressive duty on the sugar actually produced, viz. :—

From 1881 to 1883 the duty was.....	3s. 2d. per cwt.
From 1883 to 1886 it is to be	4s. 0d. ,,
From 1886 to 1889 it is to be	5s. 3½d. ,,
After 1889 it is to be	6s. 2½d. ,,

This duty is payable in paper at the close of the campaign. At the present moment all kinds of home-produced sugar pay about 4s. per cwt. duty, whilst imported raw sugar pays a duty of 21s. 6d. per cwt., and refined sugar 32s. 3d. per cwt. In no other European country is such protection accorded to home-produced sugar. The quantity produced in Russia has of late years about met the consumption, although in 1877 there was an excess production, and Russia exported about 60,000 tons.

In face of the enormous difference between prices in the country and in the rest of Europe, the Russian manufacturers are exposed to considerable danger in the event of over-production. Mr. Licht estimates the production 1884-85 at 335,000 tons, which, according to the calculations made by Görz, would be about 50,000 tons in excess of the consumption. No wonder, then, that failures have taken place, one amounting to 9,000,000 roubles (£450,000). The cost price of white sugar averaging 24s. per cwt., and there being no premium on export, the Russian manufacturer can find no outlet for his over-production except at a ruinous sacrifice.* At Kieff, where the annual contracts (which have just been concluded) have often amounted, in the case of individual merchants or speculators, to between one and two million poods, the total transactions this year have only reached 100,000 poods.

It will be interesting to follow the phases of a crisis, which, as far as can be seen, is imminent, and which an excessively high import duty, actually exceeding the present price of sugar in the inland markets, has been powerless to avert.

*It is reported that the Russian Minister of Finance is about to propose a very high bounty for Russian sugar in order to stimulate its exportation.—
Ed. S. C.

ON PROFITABLE FRUIT CULTIVATION.

By JOHN WATKINS, (of Pomona Farm, Withington, Herefordshire).

Continued from page 322.

As regards situation and soil, nearly all our county is adapted for the growth of apples, and apples do well in almost any aspect, but I think that a south-west aspect, with a slight inclination to the south, is the best. Orchards usually do not bear regularly on the banks of a stream, or in low-lying situations, as the spring frosts and fogs have then much more power over them; a good belt of trees or a high hedge does much to protect them. Damsons are also frequently planted rather thickly round the outside of the plantations, as they soon form a protection, especially for dwarf trees and the small fruits. One of the best nurseries for a young orchard is a hop-yard. They there have all the benefit of the extra cultivation, and want little protecting. Apples like a dry subsoil, and it is no use planting badly-drained land. If on pasture, your next proceeding should be to protect your trees against stock, and it is no use planting unless you protect your trees from injury after they have been planted. I have often heard a very old friend of mine say, "A good protector is worth four planters." How often you see young orchards utterly ruined from want of protection. In regard to the after-treatment of young orchards, and also of the older-established ones, it is not desirable to manure your young orchards too heavily, unless they are bearing heavy lots of fruit, and do not seem to grow freely, as they are apt to make a lot of gross, unripened wood, which the first severe winter kills off, or causes to canker; but manuring the older orchards is a matter which should always receive attention. No land repays you so well for good and liberal treatment as your orchards, and you almost invariably see those used as pig runs bear heavy crops. Pruning is a matter, too, that requires close consideration. A young orchard requires a little done to it every year. Cut out all boughs that cross, keeping the centre of the tree pretty open; stop any branches that are growing away from the rest, thus getting an evenly-balanced head; but do not prune severely. If this is attended to, you will find little is wanted in the shape of pruning when the tree gets to its full size. In my belief, three parts of the pruning done to the old orchards in this county does much more injury than good, the plan usually followed by the so-called pruners being to

commence at the body of the tree, shred each limb of all the smaller branches, leaving the ends of the boughs a tangled mass. The small wood near the outside of the tree is seldom touched, as the pruners are too lazy or ignorant to get out to them; but larger limbs on the lower part and centre of the tree are often cut off. These places can never properly heal over, but they soon decay and form holes for starlings and other birds to nest in. The effect is also to throw all the fruit-bearing on the ends of the boughs, and, when a crop of fruit comes, the leverage is so great on the limbs that they often break off. You mostly see an old orchard go down much quicker after being pruned. In my opinion the only pruning you want to give an old orchard, if properly attended to when young, is to cut out the dead and cross boughs, and to thin out the small wood, to let the sun and air into the centre of the tree. Moss and lichen are frequently found on trees in cold or damp situations. I have seen a paraffin wash advocated, but, besides being too expensive in application, I believe it would be as dangerous to the tree as to the moss. The best treatment is a lime wash, darkened with a little soot, for the body and large limbs, and for the smaller branches freshly-slaked lime thrown on the windward side on a damp day. This will kill all the moss it settles on, and what falls to the ground will not be wasted. In young orchards you often see trees, of some sorts, grow freely, make large and fine heads, but bear no fruit. In these cases root pruning will mostly prove effectual in checking the sap and thus forming fruit buds, and I know several cases in which it has been tried successfully in this county, but of this, personally, I have had no experience. No doubt it will effect its object, but I should doubt whether trees so treated would make the fine and healthy trees they otherwise would have done. I think that root pruning is more applicable to bush or dwarf trees than to standards. I should rather plant only the heavy cropping sorts which crop freely naturally. Heading back trees of inferior sorts and re-grafting with better ones has often been recommended. If you have young, healthy trees of bad sorts by all means do so, but I have seen so many old trees entirely killed, by being beheaded or grafted, that I cannot recommend it. They will start the grafts well for a year or so, but then die. If they could be beheaded gradually perhaps this might assist them to use up the superfluous sap. I now come to what I think the most important of all, the harvesting and marketing of our fruit, for it is no use

growing good crops if we do not make the most of them after they are grown. We are in this matter a long way behind the Americans and Canadians; and when we consider that there was last season, up to the end of December, about 600,000 barrels of apples imported from America, not including Canada and Nova Scotia, from which there were about half as many, we can judge that we have no mean opponents to compete with; and not only do they contend against us in quantity, but they beat us in quality and price. And here we have our most hopeful view of the case, for there is no reason why our quality should not be equal or superior to theirs. I have often seen or heard the question asked, "Why are American apples worth more than ours?" I will try to answer this question. When a retailer or consumer orders a barrel of Newtown pippins or other good American dessert apples, or a barrel of the best American cooking apples, he can depend upon getting what he orders, and upon having an even, bright, and good sample throughout the barrel; but if he goes into the market and buys English apples he most likely gets them of mixed sizes, many bruised, and perhaps of several sorts and qualities; even if they are good on the top, as he gets nearer the bottom he often finds them of much worse, or perhaps a different sort altogether. I dare say most of you know how prevalent is the custom amongst fruit dealers of what they call "topping them up." The buyer will, therefore, buy where he can depend upon having what he orders, even if he has to pay a much higher price, and thus the American and Canadian apples have gained a reputation for themselves in our markets. Here we have the remedy in our own hands. We must take more care in harvesting our fruit. If the fruit is of culinary or dessert sorts see that it is carefully handpicked, not a pretence. Apples should never be thrown or let fall into the basket, but each apple should be placed, not dropped. I often tell my pickers they should be handled as carefully as eggs. Keep the windfall, bruised, and undersized apples by themselves, to be marketed separately. Grade your apples in different sorts and sizes, never mix them. A mixed sample is always worth from 25 to 40 per cent. less than if all of one sort. A very frequent mistake is to pick apples before they are ripe; I would rather have a few injured by falling than pick them too early. It is wonderful what colour a few days' sun will give apples when nearly ripe. They also keep much better, and do not shrivel if picked when perfectly ripe. Apples for late

keeping are best left on the trees as long as possible without danger from frost, but when your apples are perfectly fit to be gathered get them in as fast as possible. Take care they are perfectly dry when picked, or they will not keep. The best means of storing is, too, a matter of importance. I believe that the less an apple is handled after being picked the better will it keep. The bushel of cooking apples with which I took first prize in July a few years back, at the Royal Agricultural Show at Reading in July, 1882, was simply placed in a hamper immediately after being picked, put in a cool cellar, and never moved again till a few days before the show. Fruit keeps best when kept from the light, and in a low and uniform temperature. The store should be well ventilated, but not exposed to draughts. If you have cider apples, pick each sort by itself, for a cider apple, like a dessert or cooking apple, has its season of greatest perfection. If you follow these directions you can market your bruised and most perishable fruit first, or turn them to other purposes, and need not force your whole crop on a glutted market, or have to sell to the first buyer who will take them. To show what interest is taken in the cultivation of apples in the United States and Canada, I have taken the following extracts from the very interesting paper written by Mr. Whitehead in the Journal of the Royal Agricultural Society, to which I have before referred:—There is a large Fruit Growers' Association in Ontario, devoted to the improvement of the cultivation, packing, and preserving of fruits. In 1880 a Commission was appointed by the Lieutenant-Governor to inquire into the progress of agriculture, and in the report much valuable information is contained, which is not only most useful and deeply interesting to Canadian cultivators, but to all other fruit producers. A large fruit grower in Ontario, in his evidence before the Commission, says: "There is nothing to prevent our apples from competing successfully with the English apples in England, if they are properly sent. We have beaten them in their own market with the Ribston Pippin." Not only do the Canadians exercise the greatest skill in the cultivation of apples, but they understand the art of storing them. The most approved plan, according to the evidence given to the Commissioners, is to place them in cellars well drained and ventilated, in which the temperature is maintained at from 32 to 35 degrees. "To manage a fruit cellar successfully requires skill, judgment, and a constant supervision." In another place, he says, "The light should be admitted sparingly,

the air kept pure, and the temperature low and uniform. Re-packing for market is well done. Choice dessert apples are wrapped singly in coloured tissue paper, and the bottoms, sides, and tops of the barrels are also lined with tissue paper." The following description of the selection and packing of this fruit will, it is thought, give many valuable hints to English growers: "If apples are to be packed in the orchard," says one of the witnesses before the Ontario Commission, "a tent should be put up to shade the fruit from the sun, with a table under it. Nail strips of wood round it to keep the fruit from rolling off; cover it with woollen cloth, so that the pickers may empty their baskets without injuring the fruit; let the packers select the fruit, rejecting every apple that is under size, spotted, wormy, or deformed in any way. Don't be tempted to put medium and large-sized apples in the same barrel. Pick the apples carefully, lay them down, don't throw them the whole length of the arm so that they rattle against each other, and empty them gently upon the table for selection." I ask you, if these directions are carried out, and I believe they are to a great extent, is it any wonder that the Canadian apples are so much superior to ours? But why cannot we do the same, although I do not say we need follow these directions in every detail? Still I think there is much in the remarks we can profit from. There is much more I could say on fruit cultivation, in regard to the security to the tenant who plants fruit trees, and also the cheapening and facilitating the transit of fruit by rail, and the injustice of the preferential rates given to foreign produce, but I have already trespassed too much on your time, so I will leave this part of the question to someone more experienced and more competent than myself. Before concluding, I should recommend you to plant the best cider fruit on your deep lowlands; dessert and cooking apples, plums and pears, on your sunny slopes; and damsons in your hedgerows. Take care of them, and you will get repaid for the outlay. And, to sum up, the secret of making fruit growing profitable is to plant only sorts of good quality, heavy croppers, and of good large size, take care of them when they are planted, do them well, train them up in the way they should go, pick and market them carefully, and I do not think you will then be beaten by the American fruit, but, having a superior class of fruit to offer, you will get a better class of local buyers than we usually have at the present time, and will have no difficulty in disposing of your fruit at paying prices.

HISTORY OF THE GERMAN SUGAR INDUSTRY FROM 1844 TO THE PRESENT TIME.

BEING A REPORT BY MR. SCOTT, SECRETARY OF THE BRITISH
EMBASSY, BERLIN, ON THE BOUNTIES ON RAW SUGAR
EXPORTED FROM GERMANY, DATED 20TH NOV., 1884.

Origin of tax on roots.

In 1844, when it was first decided to impose a tax on the manufacture of German beet sugar, the industry was considered to be sufficiently protected by the following duties on foreign sugar :—

Duties on foreign sugar.

- 30 marks per 1 centner of hard sugar, candied, and white crushed sugar.
- 24 ,, 1 ,, of raw and powdered sugars.
- 15 ,, 1 ,, of raw sugar for refining purposes.

The tax was imposed in the form of an excise on the home-grown roots of 15 pfs. per 1 centner of roots, which, on the calculation that 20 centners of roots were required to produce 1 centner of raw sugar by the only process of manufacture then known, was estimated would represent an excise of 3 marks on each centner of sugar.

In 1850 this excise was raised to 30 pfs., and in the year 1858 to 75 pfs., the foreign duties remaining at the former figures, but in 1861 these duties were lowered to 22 marks, 18 marks, and 12·50 marks respectively.

First export drawbacks.

In the same year the first drawbacks were given to the exporter of German sugar. These were fixed as follows :—

- 8·25 marks on each 1 centner of raw and powdered sugar.
- 10 ,, ,, 1 ,, of hard sugar and candies.

In 1866 the drawbacks were raised to 8·60 marks and 10·50 marks.

In 1869 the duties on foreign sugars were again lowered to—

- 15 marks per 1 centner of refined sugar, and raw sugar of No. 19,
Dutch standard.
- 12 marks per 1 centner of other raw sugars.

Assessment of 1869.

The drawbacks hitherto allowed to German refiners importing foreign raw sugar were abolished, and the excise on German roots fixed at its present rate of 80 pfs. per 1 centner. This, on a calculation made by experts at the time that 12·50 centners of roots were required to produce 1 centner of raw sugar of 93·75 per cent. polarisation, would represent a tax on such sugar of 10 marks per centner.

The drawbacks on raw sugar were fixed in accordance with the same

calculation to correspond with the amount of the excise paid on the quantity of roots required to yield—

- (a) 1 centner of sugar of the lower polarisation of 88 per cent. ($11\cdot75$ centners to 1 centner) ($11\cdot75 \times 80$ pfs. = 9·40 marks); drawback on raw sugar .. at 9·40 marks.
- (b) For candies and white hard sugar in loaves of 25lb. weight, or crushed, on calculation of 14·37 centners of roots to 1 centner sugar ($14\cdot37 \times 80$) at 11·50 marks.
- (c) Other refined sugar of at least 98 per cent. polarisation, requiring 13·50 centners of roots to 1 centner sugar ($13\cdot50 \times 80$)..... at 10·80 marks.

In fixing these rates the Government were so far from contemplating an export bounty, that they intentionally limited the amount of drawback to the amount which the experts considered had been actually paid in excise on the roots required for the lowest standard of raw sugar produced for export, and at 60 pfs. less than the estimated tax paid by 1 centner of raw sugar of 93·75 per cent. polarisation.

Standard of raw sugar exported.

The official returns for 1869 show that in that year the actual total export of German raw sugar was distributed thus:—

	Raw Sugar of		
	Polarisation, 88 to 90 per cent.	Polarisation, 90 to 93 per cent.	Polarisation, 93 per cent. and upwards.
Percentage of total amount of Raw Sugar export }	62·5 per cent.	26·5 per cent.	11·52 per cent.

Improvements since 1869 in manufacture from roots have resulted in additional gain of sugar and unintentional bounties on export.

In recent years, however, it has become notorious that, owing to improvements in the quality of the raw material, but principally to the employment of recently-discovered mechanical and scientific appliances, the German manufacturers have been enabled to get a much larger sugar profit out of the roots, and thus to evade the payment of the full tax contemplated by the Legislature on each centner of manufactured sugar, and secure an unintentional bounty on the export of sugar abroad to the extent of the excess of the legal drawback over the amount of the tax actually paid on the roots used.

The accompanying tables (Nos. 1 and 2) will give some idea of the loss thereby inflicted on the Imperial Exchequer.*

Entailing loss of revenue to Imperial Government.

The production of sugar, it will be seen, has increased five-fold from 1871-83. The population of the Empire has advanced from 38,777,000 to 45,618,000. The home consumption of sugar, which was 5·5 kilogrammes per head in 1871-72, rose to 7·2 kilogrammes per head in 1873-74, remained nearly stationary at 6·7 kilogrammes from 1877-82, and only in the last year, 1883, made a sudden rise to 8·0 kilogrammes per head of population. The revenue, on the other hand, which the Government derived from the excise on roots in 1883, was not larger than the average annual yield of the years 1869 to 1874, and fell short of the average yield of 1874 to 1879 by five millions of marks.

During the same period the export of German sugar has so rapidly and enormously grown that it now forms three-fifths of the total amount of sugar produced.

Of the total export of raw sugar in the year 1882-83, viz., 7,814,054 centners, more than four-fifths, or 6,445,210 centners, were shipped to Great Britain.

In the period of the highest yield of revenue, the average amount netted by the Government, after deducting drawbacks and cost of collection, was..... 49,462,182 marks = 1·15 marks per head of population.

And in the last three years
(1880-83) the amount netted was 42,245,060 marks = 0·93 marks „
Showing a decrease of 7,217,122 marks = 0·22 marks „
This decrease was made up of

decrease in excise 4,687,399 marks = 0·15 marks „
Do. duties 2,529,183 marks = 0·70 marks „

A tax equivalent to 1·15 marks per head of population (in 1883, 45,221,333 of population) ought to have brought in 52,000,000 marks, or nearly 10,000,000 more than the actual yield of revenue in those years.

Assuming for the next period of three years a population of 46,500,000, a tax of 1·15 marks per head ought to produce 53,500,000 marks, or 11,250,000 marks more than it has done in the last period of three years.

Inquiry by Committee of Experts resolved on—Object of Inquiry.

With a view to making up this deficiency, the German Government determined last year to institute a searching inquiry into the whole sugar question, and if possible to re-adjust the rates of excise and drawbacks, on a scale more in conformity with the present state of the sugar industry, keep-

* These will be given next month.

ing in view the original intention of imposing an excise equivalent to 10 marks on 1 centner of raw sugar of 93·75 per cent. polarisation, and of limiting the drawback on export to the actual amount of the tax paid on the raw material.

As, however, it was self-evident that it would be almost impossible, so long as the tax is imposed as at present on the raw material and not on the manufactured article, to fix a hard-and-fast rate of drawback which would entirely exclude the possibility of individual manufacturers in exceptionally good years and in exceptionally favoured districts and circumstances obtaining a certain amount of bounty without injustice to the whole class, the Government determined to extend the inquiry to the questions whether the present mode of taxation should be retained or abandoned for some other mode of assessment.

Its composition—Interim reduction of drawbacks.

To serve any useful purpose such an inquiry had necessarily to be a thorough and lengthened one, and it was decided to entrust it to a special committee of experts, and in the meantime, to meet the exigencies of the moment, an interim law was passed reducing the rates of drawbacks by 40 pfennigs in each class, to take effect from September, 1883, to August, 1885, by which time it was hoped that the Government would be prepared with a permanent measure.

The reduction in question was made on the assumption that 1 centner of raw sugar of 93·75 polarisation could now be easily obtained from 12 centners of roots, and 1 centner of raw sugar of 88 per cent. polarisation from 11·25 centners ($11\cdot25 \times 80 = 90$).

Proceedings of Experts Committee.

The Committee met at Berlin on the 11th of June, 1883, and was composed of twelve members; one of these, Herr Baccius, of the Imperial Treasury, represented the Imperial Chancellor; the others were financial experts, leading manufacturers, and refiners selected by the different sugar-producing States of the empire, Prussia being represented by four, Bavaria, Wurtemberg, Baden, Mecklenburg-Schwerin, Saxe-Weimar, Brunswick, and Anhalt, each by one member.

In the course of 25 sittings the Committee examined 55 of the most eminent manufacturers, refiners, beet growers, financial and sugar experts, representing different districts, interests, and shades of opinion on the sugar question; and in order to ascertain the actual results of the sugar yield in the last three seasons, they addressed a circular to all the sugar manufacturers in Germany, asking for full answers to queries respecting the work done in their establishments, the processes employed, and cost of working, as also the description and quantity of sugar produced by them in these three seasons.

This circular was answered for—

1880-81....by 313, out of total number of 333 factories.

1881-82....by 326 ,, ,, 343 ,,

1882-83....by 347 ,, ,, 358 ,,

The results of the oral examination of the experts, and of the information supplied by the manufacturers, are embodied in the protocols of the 25 sittings, and the voluminous appendices and statistical tables which accompany the exhaustive report submitted by the committee to the Federal Council on the 21st May of this year.

Its results in their bearing on subjects of present Report.

This information, which has been kindly placed at my disposal by the Minister of Agriculture, may be regarded as the most reliable which can at present be obtained, and will enable me to deal with most of the points to which the Board of Trade has directed my attention.

1st. Actual amount of bounty which raw sugar has been unintentionally receiving.

The first point on which it seems desirable to have clear information is that of the actual amount of unintentional bounty which it is asserted the exporter of German sugar has been lately receiving.

This can, of course, only be approximately ascertained, but it is quite clear from the information collected by the experts that the calculation on which the present interim reduction of the drawbacks was based was an inaccurate one.

That calculation, it will be remembered, was based on the assumption that 12 centners of roots were required for 1 centner of raw sugar of 93·75, and 11·25 centners of roots for raw sugar of 88 per cent.; in other words, that the average sugar profit of the roots had advanced from 8 per cent. of their taxed weight in 1869 to 8·34 in 1883.

Additional sugar gain from roots since 1869.

The experts orally examined were unanimously of opinion that the improvement which had taken place in the quality of the roots, and principally in the methods of manufacture, has resulted in a considerably larger gain of sugar.

From improved quality of roots.

The improvement in the quality of the raw material was due to better and more scientific preparation of the soil and careful selection of the description of roots best adapted to yield the largest amount of sugar. For this the growers were indebted to the scientific information supplied to them by the manufacturers and to the vigilant control to which they readily submitted in return for direct advantages and interests in the manufacture afforded to them.

Improved processes of manufacture.

The experts were of opinion that the maximum of improvement possible in this respect had already been obtained, but that its influence in increasing the quantity of sugar had been inconsiderable in comparison with that of the improvement in the methods of manufacture.

Diffusion.

This consisted in the more general adoption of the process of diffusion in the extraction of sugar from the roots. In the season 1882-83 343 of the total number of 358 factories at work that season employed this process. Still greater was the gain from the new processes for expressing sugar from the remnant molasses, separate establishments being now exclusively engaged on this special branch of the industry. By the term molasses in this case is meant the syrup remaining after the crystallisation of the sugar, which, after reboiling, is left to settle down and finally refuses to yield by direct processes any sugar separating in the form of crystals. As a matter of fact, this syrup is known to contain still 50 per cent. of sugar capable of crystallisation.

Osmose process.

The further processes employed to obtain this are, 1st, the Osmose method, which is now used in many of the factories engaged in the extraction of sugar direct from the roots, to increase the products of the second and third boilings. It may therefore be considered as simply a cheap and easy means of clearing syrups containing a large proportion of salts, and as an improvement of the direct process of manufacture.

The cost of setting up an Osmose apparatus is estimated at 1,000 to 1,500 marks (£50 to £75).

The other processes, in which lime and strontian are used, are expensive and patented methods.

Elution processes with lime.

The lime processes most employed are seven in number—

1. The Scheibler-Seiffert method by elution.
2. The Manoury method.
3. The Weinrich method.
4. The Drevermann's method.
5. The Substitution process.
6. The Soestmann's precipitate.

Latest Discovery—Separation process.

The 7th is a new discovery, termed the Separation process, which was employed in the course of last season with great success; the principle on which it is based is the use of lime ground to a fine powder. The results attained are said to equal those of the Strontian process, and the cost of setting up and working considerably less than even the other lime processes.

The Elution and other lime processes require a more costly and complicated apparatus than the Osmose method, and necessitate a capital of about 200,000 marks, or £19,000.

The average per-centage of sugar gained from the molasses by the lime processes is difficult to estimate, but the expert, Herbertz, put it in round numbers at 32 per cent. for the Substitution, and 35·44 per cent. for the other methods of elution; he seemed, however, to think the latter estimate rather too high.

Strontian process.

The Strontian process, which has till now been the most successful, is far the most costly. The capital invested in the principal establishment at Dessau amounted to two millions of marks (£100,000), and in the Rositz Works, 1,700,000 marks (£850,000).

The Strontian establishments have till now been very reticent in regard to the actual results which they have obtained, as their experiments were not completed; but the per-centage of sugar which they are in the habit of obtaining from the molasses is now pretty well ascertained; and, in the case of the Dessau Works, is estimated at 40 per cent. in raw sugar; at Rositz at 40 per cent. in raw sugar of 91 to 94 per cent. polarisation. The Strontian process has this great advantage, that by adding raw sugar it can produce sugar ready for consumption, while the Osmose and Elution processes can only give raw sugar.

Relative profits of different new processes.

The relative profits of the different processes were estimated by the Committee to be as follows:—

	Marks.
<i>Osmose</i> , giving a sugar yield of 20 per cent., requires 5 metrocentners of molasses, at 10 marks per metrocentner.....	50
To produce 1 metrocentner of raw sugar, which would not fetch more than a price of.....	52
Cost of working (1·50 marks per metrocentner of molasses)	7·50
	5·50
This loss of 5·50 marks will have to be deducted from the value of the remaining molasses, which would be 50 per cent., valued at 8 marks per metrocentner.....	20
Total net profit.....	14·50
The <i>Elution Processes</i> , giving a sugar yield of 34 per cent., would produce from 2·94 metrocentners of molasses	29·40
One metrocentner of raw sugar	54
Cost of working, 4 marks per metrocentner of molasses.....	11·76
Total profit, 13 marks—plus value of residuary syrup.	
The <i>Strontian Process</i> .—Sugar yield, 40 per cent.; molasses required, 2½ metrocentners.....	25
Cost of working, 9 marks per metrocentner	22·50
Total cost	47·50
Value of sugar gained	60
Total profit—value of residuary syrup, and	12·50

These results were in the opinion of the committee sufficient to account for the high dividends which the establishments exclusively engaged in expressing sugar from molasses are in a position to pay even in moderate seasons.

The number of establishments engaged in extracting sugar from molasses in 1882-83 were 205.

Processes employed.	Factories.	Quantity of Roots used. Metrocentners.
1.—Osmose method	136	32,743,419
2.—Elution method	50	15,542,271
3.—Substitution method	12	3,693,697
4.—Strontian method	4	1,390,067
5.—Other methods.....	3	1,303,536
	205	54,672,990

*Different estimates of sugar gain from roots, and consequent bounties—
Oral evidence taken by Committee.*

The additional gain from the introduction of these various processes in the sugar yield of the roots since 1869 was differently estimated by the experts. They agreed to estimate the gain from the adoption of the process of diffusion as equivalent to an additional sugar profit of 0.50 per cent. of the weight of the roots. The majority put the additional gain from the various processes employed on the molasses at from 0.83 to 1 per cent.; total gain since 1869, 1.33 to 1.50 per cent. This calculation would give a total sugar profit from the centner of roots of 9.33 to 9.50 per cent., instead of 8 per cent.; in other words, that 10.53 centners to 10.72 centners of roots were now required to produce 1 centner of raw sugar of 93.75 per cent. polarisation. The minority thought this estimate too high for the gain by expression from molasses, and fixed it at 0.59 per cent., or total gain since 1869, 1.09 per cent. Present sugar profits of roots = 9.09 per cent., or 11 centners of roots to 1 centner of sugar of 93.75 polarisation.

According to the calculation of the majority of the committee, the average amount of excise paid on each centner of such sugar would have been $10.53 \times 80 = 8.42$ marks, or $10.72 \times 80 = 8.57$ marks. The drawback of 9.40 marks would therefore have given a bounty of 0.98 marks, or 0.83 to each centner of raw sugar of this standard of polarisation in 1883, and the new drawback of 9 marks, a bounty this year of 0.58 or 0.43 marks.

*Evidence obtained from German manufacturers in reply to Query
Papers for three last seasons.*

These calculations were subsequently compared with the information contained in the replies to the queries addressed to the manufacturers. A few sent answers so obviously imperfect or incorrect that the committee could make no use of them. The facts supplied by the rest are summed up thus:—

	FOR SEASONS				Average of Three Seasons.
	1880-81.	1881-82.	1882-83.		
Number of factories supplying information	299	314	335		316
Taxed roots used	57,256,604	57,130,724	81,214,838		65,200,722
Sugar obtained from them	5,121,606	5,590,956	7,765,946		6,159,503
Total number of factories (official statistics)	333	343	358		345
Total amount of roots used	63,222,030	62,719,479	87,471,537		71,137,682
Total yield of sugar reduced to raw sugar	5,559,150	5,997,223	8,351,646		6,636,006
If missing factories obtained an equally large yield with the factories sending complete returns, the total yield of raw sugar of 93-75 polarisation would have been	5,655,214	6,137,885	8,364,226		6,720,367
Add sugar from molasses	40,961	62,233	74,463		59,210
I.—SUGAR YIELD	5,696,175	6,200,118	8,438,689		6,779,586
Roots to 1 centner of raw sugar of 93-75 polarisation	11-099	10-116	10-366		10-493
Sugar profit of roots	9-010	9-885	9-647		9-53
Thus actual tax on 1 metrocentner of raw sugar of 93-75 polarisa- tion	17-7564	16-1856	16-6856		16-7888
Assuming that missing factories obtained minimum yield reported, and required roots to centner of raw sugar of 93-75	13-85	12-01	11-53		12-34
The yield from roots used	5,965,426	5,588,775	6,256,699		5,936,960
Would have been	430,717	466,342	642,645		481,115
Add ascertained yield of other factories	5,162,567	5,653,189	7,840,409		6,218,722
II.—TOTAL YIELD OF SUGAR	5,593,284	6,118,531	8,383,054		6,699,837
Or roots to centner of sugar of 93-75 polarisation	11-303	10-251	10-434		10-618
Sugar profit of roots	8-847	9-755	9-584		9-418
Or tax paid on each centner* of sugar of 93-75 polarisation	18-084	16-4016	16-6944		16-9888

* (? metrocentner) ten metrocentners equal to one ton.

This information would represent an additional average gain since 1869 in the value of the root of 1·41 to 1·53 per cent., as compared with the estimate of the majority of experts examined of 1·33 to 1·50 per cent. The average quantity of roots required to produce 1 centner of raw sugar of 93·75 polarisation at from 10·49 centners to 10·61 centners compared with the experts' estimate of 10·53 centners, 10·72 centners, and 11 centners.

Average sugar yield of roots fixed by Committee.

The committee finally decided by a majority of seven to five votes to take 10·75 centners of roots as a suitable average for 1 centner of raw sugar of the above-mentioned standard of polarisation, which would correspond to 10 centners to 1 centner of sugar of 88 per cent. polarisation.

The minority would have preferred that the average should have been fixed at 11 centners.

Reason for striking average from periods of three years.

It was admitted on all sides that the season of 1881-82 had been an exceptionally favourable one, and that 1880-81 had been a little below and 1882-83 a little above an average season for beet.

The necessity for striking an average from periods of three years was thus explained.

A beetroot crop is notoriously most exacting in regard to climate. Sown in April or May, it remains in the ground until September, and forms sugar mostly towards the end of its period of vegetation. It requires a warm and moist spring to promote the growth of the plant, which is crippled or retarded by night frost. In summer it requires plentiful light showers to nourish the plant, while excessive rain makes the root watery, and augments the volume of the non-saccharine particles. It is evident that all these requirements will scarcely be fulfilled by an average season.

Approximate calculation of bounties obtained since 1869.

The committee did not consider it necessary to extend this inquiry further back than the year 1880; but in order to form an approximate estimate of the average bounty obtained by the German manufacturer in periods of three years since 1869, I have utilised the table given in Herr Görz's interesting work on the "Sugar Production of the World," published this year.

Approximate amount of average bounties obtained since 1869.

The returns for the year 1870-71 are there given on the authority of Herr von Haufmann; but as this year coincided with the Franco-German War, it must be regarded as an exceptionally unfavourable one for all branches of industry. I have therefore omitted it in the calculation of averages.

The succeeding returns are given on the authority of the sugar expert, Herr Herbertz—

Years.	Number of Factories at work.	Quantity of Roots Employed in Tons of 1,000 Kilos.	Yield of Raw Sugar from Roots Taxed, in Tons of 1,000 Kilos.	Average Quantity of Roots to 1 Centner of Sugar.	Triennial Average.	Rate of Drawback.	Average Difference between Tax on Roots (80 pfgs. per 1 centner) and Drawback given.
1870-71	334	3,050,645	186,418	Centn'r. 16.36	12.10	Marks. 9.40	Marks. + 3.68
1871-72	311	2,250,918	186,411	12.07			
1872-73	324	3,181,550	262,551	12.11		9.40	+ 0.28
1873-74	337	3,528,763	291,040	12.12	11.54	9.40	- 0.17
1874-75	333	2,756,745	256,412	10.75			
1875-76	332	4,161,284	358,048	11.62			
1876-77	328	3,550,036	289,422	12.26	11.13	9.40	- 0.50
1877-78	329	4,090,968	378,009	10.82			
1878-79	324	4,628,747	426,155	10.86			
1879-80	328	4,805,261	409,415	11.73			

It must be borne in mind that the annual yield of sugar given in this table, which is evidently based on official returns, is not specified as representing any particular standard of polarisation; the total amount of refined sugar being no doubt, as usual, reduced to raw sugar in the proportion of 100 to 125.

Dividing the quantity of roots by the amount of sugar produced from them, we find in 1870-71 an average of 16.36 centners roots required for one centner of raw sugar; the drawback would accordingly that year have been 3.68 marks less than the tax actually paid on the roots. In the years 1871-1874 the average amount of the tax paid would have been 0.17 marks more than the drawback of 9.40 marks. In the years 1874 to 1877, the excess of the drawback over the tax paid would represent a bounty of 17 pfs., and in the years 1877 to 1880 an average bounty of 50 pfs. per 1 centner.

The amount of the bounty obtained by the exporters of German raw sugar of 93.75 polarisation, in the period embracing the last three years of 1880-83, can be approximatively fixed by referring to the information collected by the experts at 0.83 to 1.0 mark.

The actual amount of the bounty in each case would, however, depend upon the quality of the sugar exported, as sugar of a lower polarisation requiring a less quantity of roots, would obtain a larger amount of bounty on export.

It is, therefore, essential to ascertain in what proportions the different descriptions of sugar figure in the total exports.

Distribution of export.

The statistics supplied to the committee gave the following particulars for the last period of five years:—

Proportion of refined to raw sugar.

YEARS.	PROPORTION OF REFINED TO RAW SUGAR.		
	Total Amount of Sugar Exported.	Of this Refined Sugar of both Classes.	Proportion of Refined to Total Export.
	Tons of 1,000 Kilos.	Tons of 1,000 Kilos.	Per-centage.
1878-79	134,224	30,752	22·9
1879-80	130,104	34,941	26·8
1880-81	277,502	56,060	20·2
1881-82	308,260	54,329	17·6
1882-83	478,131	74,002	15·7

The returns of the Taxation Officer at Madgeburg, the chief centre of the German sugar trade, give some idea of the proportions in which the various standards of raw sugar receiving drawback are represented in this export :—

Proportion of different standards of sugar.

YEARS.	Per-centage of Raw Sugar of 88 p. c. to 90 p. c. Polarisation.	Raw Sugar of 90-93 p. c. Polarisation.	Raw Sugar of 93 p. c. and upwards.
1878.....	6·32	41·43	52·25
1879.....	14·96	29·99	55·05
1880.....	15·15	21·53	63·32
1881.....	18·72	17·72	63·56
1882.....	17·77	24·35	57·87

The bulk of the present export was considered by the committee to be raw sugar of 94·50 per cent. of polarisation ; this on the calculation of 10·75 ; 1 for sugar 93·75 would have paid a tax per centner of 8·67 marks, and accordingly obtained a bounty of 73 pfs. in 1882-83, and under the present scale of drawback of 9 marks, is still obtaining one of 33 pfs. per centner.

Powdered and crystallised sugar of at least 98 per cent. polarisation would require on the same calculation nearly one centner of roots more than sugar of 93·75.

Hard sugar, an additional 0·50 to 1 centner of roots.

The amount of the tax actually paid on powdered and crystallised sugar would thus be approximately stated at 9·33 marks per centner, and on hard sugar 9·96 marks per centner.

Estimated present amount of bounties obtained.

The excise actually paid, when compared with the drawbacks, gives the following result :—

	SCALE OF DRAWBACKS.			
	By Law of 1869 (A).	By Law of 1883 (B).	Tax paid according to 10·75 Centners of Roots to 1 Centner of Raw Sugar of 93·75 Polarisation.	Difference between Actual and Legal Draw- back per Centner.
	Marks.	Marks.	Marks.	Marks.
Raw Sugar, of 88 p. c. Polarisation	9·40	9·00	8·07	} A. 1·33 B. 0·93
„ 94·50 „	9·40	9·00	8·67	} A. 0·73 B. 0·33
Hard Sugar	11·50	11·10	9·96	} A. 1·54 B. 1·14
Powdered and Crystallised Sugar	10·80	10·40	9·33	} A. 1·47 B. 1·07

The amount of raw sugar at present produced under 90 per cent. polarisation is very inconsiderable; in 1882-83 only 500,000 centners out of a total of 7,814,057 centners of raw sugar; it has, therefore, been proposed to exclude this description from the benefit of any drawback whatever in the future.

Reasons for small proportions of refined sugar figuring in exports.

The small proportion of refined sugar figuring in the exports, in spite of an apparently larger gain in the drawback, was accounted for to the committee by the inability of the German refiners to compete successfully in foreign markets with the French and English refiners possessed of larger capital and establishments.

The German raw sugar manufacturer has also a greater advantage over the refiner from the six months' credit allowed by the Government for the payment of the excise on the raw material. The former is able to work so rapidly that he can nearly always expect to dispose of the bulk of his raw sugar before payment of the excise falls due, and in some cases the payment of the drawback can be effected at the same time. The refiner, on the other hand, has to purchase the raw sugar at a price which includes the amount of the excise on the roots, and has to wait for several months before he can place his sugar in the market.

To remove this disadvantage, it has been proposed to allow the refiners to take over the credit for the excise from the raw sugar manufacturer, or to pay the former his drawback at an earlier date than the exporter of raw sugar.

To be continued.

MONTHLY LIST OF PATENTS.

Communicated by Mr. W. P. THOMPSON, C.E., M.S.C.I.,
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ENGLISH.

6037. JAMES DUNCAN and BENJAMIN E. R. NEWLANDS, London. *Improvements in centrifugal apparatus for use in the refining of sugar.* 16th May, 1885.

6032. JAMES DUNCAN and BENJAMIN E. R. NEWLANDS, London. *Improvements in moulds for use in the refining of sugar.* 16th May, 1885.

6135. JOHN H. JOHNSON, London. (Communicated by Emile M. J. B. Etienne, France.) *Improvements in apparatus for the manufacture of loaf sugar.* 19th May, 1885.

6140. WILLIAM R. LAKE. (Communicated by William T. Jebb, U.S.) *Improvements in the manufacture of grape sugar or glucose.* 19th May, 1885.

6358. LOUIS LEFRANC, London. *An improved process of extracting juices, syrups, and molasses in sugar manufactories, refineries, and the like.* 23rd May, 1885.

6432. WILLIAM R. LAKE, London. (Communicated by Franz O. Matthiessen, United States.) *Improvements in the manufacture of sugar and in apparatus therefor.* 26th May, 1885.

7098. OSCAR KORSCHULT, London. (Communicated by Heinrich Soxhlet, Bavaria.) *Improvements in the manufacture of grape sugar.* 10th June, 1885.

7237. JOHN IMRAY, London. (Communicated by La Compagnie de Fives, Lille, France.) *Continuously-acting centrifugal apparatus.* 13th June, 1885.

ABRIDGMENTS.

316610. EDWARD P. EASTWICK, New York. *Top plate for bone-black kilns.* 28th April, 1885. The top plate for drying the bone-black above the kiln is formed of a series of hoppers opening into their retorts, and with no horizontal surface.

318630. O. H. KRAUSE, Jersey City, New Jersey. Assignor to the F. O. Matthiessen and Wiecher's Sugar Refining Company. *Method of making hard sugar from soft sugar.* 26th May, 1885. This invention relates to same invention as 318640 and 318639. It consists in effecting the cooling of the cakes of sugar charged with concentrated hot white-liquor by immersing such hot charged cakes of sugar in a bath of concentrated cold white-liquor, which is kept cold by being maintained in contact with chilled surfaces.

318639. FRANZ O. MATTHIESSEN, Irvington, New York. *Transforming soft sugar into hard sugar.* 26th May, 1885. This invention consists in

causing soft sugars, or granulated sugars, or mixtures of such sugars, as the case may be, to absorb or be charged with a concentrated hot pure sugar solution or so called "white-liquor," which is then cooled off, whereby a portion of the sugar of which the white-liquor is composed, incapable of being held in solution at the lower temperature, crystallizes throughout the mass of soft sugar, firmly cementing the particles of soft sugar to each other, and producing a body of hard sugar having the peculiar glistening appearance due to the presence of crystals, not only upon its exterior but also upon its planes of cleavage when broken. After the crystallisation has ceased the excess of white-liquor is drained off by any of the usual methods, and the resultant product of hard sugar, after being dried, may then be broken or cut into blocks or pieces of the desired size and shape.

318640. FRANZ O. MATTHIESSEN, Irvington, New York. and OTTO H. KRAUSE, Jersey City, New Jersey. *Apparatus for cementing granulated sugar into blocks.* 26th May, 1885. This apparatus is intended for employment in carrying out the process of manufacturing soft sugar or granulated sugar into hard sugar, described in No. 318639. It consists, first, in a moulding device for moulding soft sugar or granulated sugar into cakes, tablets, or prisms of the desired form and dimensions preparatory to baking such cakes, tablets, or prisms in an oven; secondly, a frame adapted to contain a prescribed number of cakes, tablets, or prisms, and provided with a handle, by means of which it can be lifted; thirdly, a charging-box, adapted to receive the said frame, and provided with a removable tight-fitting cover and connections by means of pipes provided with valves respectively, with an air pump or vacuum chamber, and with a reservoir for supplying the hot white liquor; and, finally, a cooling tank for containing a bath of concentrated cold white liquor, and means for keeping down temperature of the cold white liquor in the cooling tank after the frames containing the hot charged cakes of sugar are deposited therein, also an apparatus for charging soft sugar or granulated sugar, or mixtures of soft and granulated sugars, with hot white liquor, the said apparatus consisting of a box or receptacle for said soft sugar or granulated sugar, or mixtures thereof, and a removable cover adapted to bear upon and make a tight joint with the open top or end of the box or receptacle, and connections by means of pipes provided with suitable valves respectively, with an air pump or vacuum chamber, and a reservoir for supplying hot white liquor.

318815. JESSE M. SPROAT, North Benton, Ohio. *Sap-boiling apparatus.* 26th May, 1885. This is a sort of double-effect apparatus for use in sap boiling. The vapour from the sap boiler passes through pipes in a vertical sap heater to the chimney.

318866. WILLIAM E. BUTLER, Newbern, Tennessee. *Evaporator for cane juices.* 26th May, 1885. This evaporator is divided into deep longitudinal

compartments with heating pipes at bottom, and an endless chain of scum rakes passing over each compartment up the slanting end and back under the bottom.

GERMAN.

ABRIDGMENTS.

29026. THEODOR OTTO, Schkeuditz. *Filter with utilization of exhaust steam for weak and concentrated liquor.* 22nd January, 1884. In vertical pipes surrounded with exhaust steam and forming part of a fixed cylindrical boiler, constructed like the so-called vertical evaporating apparatuses for sugar manufactories, are pipes which are closed and perforated at their lower end like a sieve, in which pipes filter bags are suspended, filled with sand or bone-black. The luting between the turned over edge of each pipe and bag and the pipes of the boiler is effected by means of washers and ring clamps, which are provided with three cut out spaces on their edges, and three wedges, which, when on being turned by aid of a special key, are forced under three projecting tappets.

29039. FORSTREUTER BROTHERS, Oschersleben. *Continuous automatic saturation vessel.* 11th March, 1884. A horizontal cylinder is divided by partitions into several chambers with a small inlet at the bottom for the juice, and another at the top for the carbonic acid. The juice meets the carbonic acid, and is continually dashed by a stirrer composed of six spoon shaped arms against the inner sides of the saturator, and in this way becomes thoroughly mixed with the carbonic acid. In order to utilise the gas as much as possible, an apparatus is fixed in the outlet pipe for the saturation of the juice. In this apparatus the juice flows over a row of plates placed above one another. A vertical stirrer with arms alternately bent towards the left and right aids in mixing the juice with the gas.

29044. ERNST SCHULZE, Amsterdam. *Apparatus for preventing steam from passing from the montejus into the filter presses.* 30th March, 1884. The apparatus consists of a vessel with two pipes, the upper one of which leads to the montejus, the lower to the filter presses, and having besides a small valve on top with an alarm whistle. The valve belonging to the upper shaft and the valve of the small valve are attached to a float. When the apparatus is filled with juice the float rises, consequently the lower valve opens and the air valve closes. If, on the contrary, the steam forces itself in after the montejus is emptied, the float falls, but, in so doing, shuts off the lower valve and the steam escapes through the air valve and sounds the alarm whistle.

29034. JOSEPH KASALOWSKY, Prague. *Improvements in osmose apparatus.* 20th February, 1884. The frames of the apparatus are provided with perforated or slit side channels in order to distribute the flow of the molasses and water as evenly as possible throughout the apparatus, or these channels

may again be covered with sieves. The apparatus may also be made with frames in two divisions, and the latter so connected that the water together with the molasses on passing into other frames flows also into another division. In order to maintain automatically the level of the liquid entering the osmose apparatus at a certain height, their flow out of a closed vessel fixed above is made to depend on the entrance of air into the same, the end of the air pipe is adjusted at the level of the liquid in the gauge glass, so that it is opened when the latter sinks. The flow of liquid consequently continues until the end of the pipe is again covered.

29048. ALBERT SCHNEIDER, Magdeburg. *A discharge pipe for bone black furnaces.* 13th April, 1884. The discharge pipe consists of separate conical ribbed tubes, fitting over one another and over a hollow or solid middle piece, the steam which gathers in the upper parts of the furnace escapes through the spaces between the tubes.

29077. FRANZ ROTHE SÖHNE, Bernburg. *Improvements in evaporating apparatuses with horizontal heating pipes.* 11th April, 1884. In order to alter previously constructed apparatuses to the pattern described in the principal patent, one or more curved pipes are made use of instead of the method (described in the principal patent) of connecting the upper and lower divisions of the apparatus by a small orifice, which method is often on account of the smallness of the height of the side space found impracticable. The corrosion of the horizontal partition wall, and in the pipes under the same, caused by the collecting of the ammonia, is avoided by allowing the gas to escape by a small steam dome fixed in the partition wall. If a movable pipe system be adopted the partition wall can be done away with, being replaced by the upper part of the tubing of the pipe system.

29148. CHRISTIAN SIERIG, Tiegenhof, near Marienburg, West Prussia. *Apparatus for removing the water adhering to the roots after washing.* 13th May, 1884. The apparatus consists of rectangular vessels with man-hole doors and movable oblique partially perforated bottoms, which are let down when the drying process is completed, and form inclines for the roots to pass down. Compressed air is admitted into these vessels from the top thereby driving off the water adhering to the roots. If, instead of blowing in air, it be drawn through to the roots by suction, the bottom of the apparatus is not perforated.

Patentees of Inventions connected with the production, manufacture, and refining of sugar will find *The Sugar Cane* the best medium for their advertisements.

The Sugar Cane has a wide circulation among planters in all sugar producing countries, as well as among refiners, merchants, commission agents, and brokers, interested in the trade, at home and abroad.

Correspondence.

Philadelphia, April 21st, 1885.

TO THE EDITOR OF THE "SUGAR CANE."

Sir,—I am surprised to see such loose and unfounded statements, about important matters, as have appeared in the *Sugar Cane* (April number, 1885, page 195,); a Journal that has always so ably encouraged the cause of sound science, in its applications to the sugar interest.

The statements mentioned are mere copies from the former article referred to by you, and are unworthy of serious refutation not only from their anonymous character, but intrinsically because they nullify, on the mere say of an unknown author, who evidently has not a scientific knowledge of sugar, the thorough and agreeing results of men like Wild, Girard, Tollens, Landolt and others, who have made themselves special authorities in the branch of physics involved in the determination of the rotatory power of saccharose. The pure sugar on which these researches were based, was variously derived from the cane or beet, or from both.

It is a new era in Science indeed, when its primary facts are to be proved or disproved in this anonymous and uncircumstantial manner and I desire to protest against the publication of such matter; and to neutralize as far as possible the bad effect likely to be produced upon the uninformed.

Respectfully,

J. H. TUCKER.

The paper here alluded to, "Superiority of Cane Sugar over that obtained from Beet," and against the publication of which this letter of Dr. Tucker's is a protest, went to show that the polariscope is not a certain test of the sweetening power of sugar.

To ourselves the question appears to be one of easy solution. Take a pound of refined sugar made from beet, and a pound made from cane, of the same commercial value; which will hold out the longest? It may be a rude, but it is a sensible test; and we should prefer to take the result thus obtained, even though it might differ with the "thorough and agreeing results" of the chemists named by Dr. Tucker.

In this month's number, page 341, we give a paper by "Verax" on "The Rise and Progress of Beet Sugar in Europe, and their bearing upon the Sugar Industry in America," in which the writer deals with the question, and to which we would refer our readers.—ED. S. C.

UNITED STATES.

ESTIMATED SUPPLIES AND REQUIREMENTS OF SUGAR FOR THE REMAINING SEVEN MONTHS, NAMELY, JUNE 1 TO DECEMBER 31, 1885.

From *Willett, Hamlen, & Co.'s Circular*, June 11, 1885.

The Cuba crop of 1884 was 549,038 tons, and the receipts into the United States from Cuba in 1884 were 457,085 tons, leaving balance of 91,953 tons for export to Spain and Europe, and for local consumption and stock. The crop of 1885 is finished, and estimated to be 550,000 tons. Deducting the same amount as last year, plus 25,000 for increased exports to Spain and Europe, leaves 433,000 tons available for the United States, of which we have received, to June 1, 257,796 tons, leaving 175,000 tons to come to December 31st—say an average of about 25,000 tons per month. The United States received from British West Indies crops, in 1884, 102,814 tons, and have received to June 1st, 1885, 48,983 tons, leaving 54,000 tons available for United States on same basis of crop as last year, but as shipments are being directed to Europe now, it is not likely that the United States will receive over 45,000 tons from the British West Indies from June 1st to December 31st. Porto Rico gave us 56,430 tons in 1884, and has sent us 28,409 tons to June 1, leaving 28,000 tons available for United States. Brazil gave us 142,348 tons in 1884, and has sent us 89,481 tons, leaving 53,000 tons available on same size crop as previous year, but as the crop was very much less, and is now exhausted, our receipts are not likely to exceed 30,000 tons from Brazil for remainder of year, mostly of new crop. The Philippines are likely to give us 75,000 tons for remainder of year, against 47,000 tons for same time last year. The French West Indies sent us 30,053 tons in 1884, but to June 1 have sent us 10,000 tons less than same time last year, and are not likely to send us 10,000 tons for balance of year, against 14,306 tons for same time last year. China will not send us any sugar, against 3,400 tons for balance of last year. India and Mauritius, and the smaller producing countries, will send us about the same as last year. Upon the above basis, our total estimated receipts from all countries, except Europe, will be about 383,000 tons from June 1 to December 31, against 472,604 tons last year from all countries, including Europe, which sent us 49,561 tons. Stock in United States, June 1, in all hands, was 206,257 tons. Adding estimated receipts as above, 383,000 tons, gives 589,000 tons. Deduct average carrying stock in all hands in United States for January 1, 1886, at 75,000 tons (against 104,399 tons January 1, 1885), gives 514,000 tons supply to December 31, 1885. The meltings of raw sugar from June 1 to December 31, 1884, were 600,422 tons, to which should be added for this year the average yearly increase of consumption, which has not yet come, say 75,000 tons, and our requirements will be 675,000 tons of foreign sugar from June 1 to December 31, 1885. Against this we have in sight as above 514,000 tons, leaving 161,000 tons to be imported from Europe for balance of year, against 49,561 tons imported from Europe for same time last year. This is the way the supply and demand question appears at this date, but changes in the parity of prices between Europe and the United States may subject it to modifications later on.

IMPORTS (UNITED KINGDOM) OF RAW AND REFINED SUGARS.

JANUARY 1ST TO MAY 31ST, 1884 AND 1885.

RAW SUGARS.	QUANTITIES.		VALUE.	
	1884.	1885.	1884.	1885.
	Cwts.	Cwts.	£	£
Germany	2,966,753	4,290,289	2,513,744	2,478,762
Holland	74,688	98,634	66,647	60,421
Belgium	289,076	135,238	258,849	80,022
France	26,171	9,728	27,067	6,637
British West Indies & Guiana	1,247,455	1,090,853	1,354,226	858,386
British East Indies	307,119	104,803	261,662	48,698
China and Hong Kong	98,277	14,679	67,976	5,644
Mauritius	139,055	74,208	112,102	40,879
Spanish West India Islands	67,557	205,602	58,880	143,247
Brazil	867,489	706,392	711,389	405,094
Java	1,816,988	2,153,659	1,792,717	1,576,033
Philippine Islands	477,090	114,454	328,242	52,926
Peru	219,997	213,004	202,026	133,840
Other Countries	240,359	292,642	228,765	194,850
Total of Raw Sugars ..	8,928,074	9,504,185	7,984,292	6,085,439
Molasses	147,837	144,570	54,571	49,412
REFINED SUGARS.				
Germany	277,065	466,932	314,470	381,932
Holland	534,923	591,502	619,248	511,172
Belgium	43,088	37,640	52,311	36,516
France	583,260	304,573	701,860	277,043
United States	253,260	979,772	280,533	841,685
Other Countries	11,625	1,911	13,076	1,489
Total of Refined	1,703,460	2,382,330	1,981,498	2,049,837

IMPORTS OF FOREIGN REFINED SUGAR.

The British Sugar Refiners' Committee furnish us with the following figures, giving the imports of foreign refined sugar for the month of May compared with the corresponding month of last year, and the average monthly imports for the year compared with those of 1883 and 1884, distinguishing the quantities of "Lumps and Loaves" from "other sorts," and giving the separate imports from each country:—

	"LUMPS AND LOAVES."						"OTHER SORTS," Including Crushed Loaf, Granulated, Crystallized, &c.						TOTAL.					
	Monthly Average.			May,			Monthly Average.			May,			Monthly Average.			May,		
	1883.	1884.	1885.	1885.	1885.	1884.	1883.	1884.	1885.	1885.	1885.	1884.	1883.	1884.	1885.	1885.	1885.	1884.
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
France	3538	2737	2384	2252	3341	2477	1853	1621	883	1585	6015	4358	3045	3135	4926			
Holland	2352	3580	4293	4398	4582	1854	1854	1948	1272	2310	4205	5528	5915	5670	6892			
Germany & Austria	588	552	926	1260	810	124	124	2380	2143	2282	2442	2932	4669	3403	3092			
Belgium	319	183	240	279	329	294	294	151	204	109	443	334	376	483	438			
United States	226	962	520	872	2757	61	61	3386	19527	3829	520	4348	9797	20399	6586			
Other Countries ..	..	..	3	..	2	..	..	121	6	449	61	121	19	6	451			
Total	7023	8014	8366	9061	11821	6663	6663	9607	24035	10564	13686	17621	23821	33096	22385			

SUGAR STATISTICS—GREAT BRITAIN.

To JUNE 20TH, 1885 AND 1884. IN THOUSANDS OF TONS, TO
THE NEAREST THOUSAND.

	STOCKS.		DELIVERIES.		IMPORTS.	
	1885.	1884.	1885.	1884.	1885.	1884.
London	95	114	164	172	169	200
Liverpool ..	120	104	131	133	139	160
Bristol	7	4	26	26	29	24
Clyde	88	69	119	118	158	124
Total ..	310	291	440	449	495	508
	Increase.. 19		Decrease .. 9		Decrease .. 13	

SUGAR STATISTICS—UNITED STATES.

(From Messrs. Willett & Hamlin's Circular, New York.)

FOR THE FOUR PRINCIPAL PORTS. IN THOUSANDS OF TONS, TO THE
NEAREST THOUSAND. FOR MAY, 1885 AND 1884.

	STOCKS.		DELIVERIES.		IMPORTS.	
	June 1st,		For May,		For May,	
	1885.	1884.	1885.	1884.	1885.	1884.
New York	110	130	88	65	113	122
Boston	31	32	23	22	28	33
Philadelphia....	7	7	10	12	11	13
Baltimore .....	..	1	..	..	..	..
Total.....	148	169	121	99	152	168
	Decrease.. 21		Increase.. 22		Decrease.. 16	

Total for the Year 512 453 570 561

In the case of Baltimore, where nothing is put down, it means that the Stock, Imports, and Deliveries, do not exceed 500 tons in each case.

THE VISIBLE STOCKS AND FLOATING CARGOES.

According to data so far to hand, from the principal Countries, as compared with the two previous years:—

		1885.	1884.	1883.
Germany.....	1st May ..	187,600	103,300	79,310 tons.
Austria	1st May ..	57,250	76,650	54,850 "
France.....	1st May ..	219,156	220,185	179,067 "
Holland	31st May ..	43,069	39,071	33,261 "
Belgium	1st May ..	63,212	38,039	26,424 "
Great Britain ..	6th June ..	306,060	289,771	242,894 "
Floating Cargoes..	6th June ..	90,519	61,891	62,835 "
Total in Europe		966,866	828,907	678,641 "
United States	28th May ..	151,778	179,626	103,483 "
Havana and Ma-				
tanzas	22nd May ..	90,745	87,820	101,279 "
		1,209,389	1,096,353	883,403 "

STOCKS OF SUGAR IN THE CHIEF MARKETS OF EUROPE ON THE
30TH APRIL, FOR THREE YEARS, IN THOUSANDS
OF TONS, TO THE NEAREST THOUSAND.

Great Britain.	France.	Holland	German Empire.	Austria.	Remaining four principal entrepôts.	TOTAL 1885.	TOTAL 1884.	TOTAL 1883.
301	219	43	188	57	36	844	743	596

CONSUMPTION OF SUGAR IN EUROPE FOR THREE YEARS, ENDING
30TH APRIL, IN THOUSANDS OF TONS, TO THE
NEAREST THOUSAND.

Great Britain.	France.	Holland	German Empire.	Austria.	Remaining four principal entrepôts.	TOTAL 1885.	TOTAL 1884.	TOTAL 1883.
1155	442	49	384	196	314	2540	2441	2375

ESTIMATED CROP OF BEET ROOT SUGAR ON THE CONTINENT OF EUROPE,
FOR THE PRESENT CAMPAIGN, COMPARED WITH THE ACTUAL CROPS
OF THE THREE PREVIOUS CAMPAIGNS.

(From Licht's Monthly Circular.)

	1884-85.	1883-84.	1882-83.	1881-82.
	Tons.	Tons.	Tons.	Tons.
France.....	325,000	.. 473,676	.. 423,194	.. 393,269
Germany (Zollverein) ..	1,150,000	.. 986,403	.. 848,124	.. 644,775
Austro-Hungary....	540,000	.. 445,952	.. 473,002	.. 411,015
Russia and Poland ..	370,000	.. 307,697	.. 284,991	.. 308,779
Belgium	90,000	.. 106,586	.. 82,723	.. 73,136
Holland and other Countries.....	50,000	.. 40,000	.. 35,000	.. 30,000
Total.....	2,525,000	2,360,314	2,147,034	1,860,974

It will be seen that Mr. Licht's present estimate is a repetition of that given last month.

STATE AND PROSPECTS OF THE ENGLISH SUGAR MARKET.

The sugar market, during the greater part of the past month, has shown very little animation. The price of beet, 88 per cent. f.o.b., which at the time of our last writing was 16s. 3d. per cwt. for prompt delivery, immediately afterwards went up to 17s.; it is now 16s. prompt, 16s. 4½d. for August, and 17s. 1½d. October-December deliveries.

Cane kinds are higher throughout by 6d. to 1s. 3d. per cwt. In May the advance in cane sugar was not equal to that in beet; taking May and June together, the advance in both kinds is about the same.

Stocks in this country continue large, but the statistical position of the United States is decidedly weak. At page 387 we give Messrs. Willet, Hamlin, & Co.'s estimate of the probable supplies and requirements of the United States for the remainder of this year; from which it appears probable that America will have to import between this time and the end of the year at least 160,000 tons from Europe to meet her own requirements. For the American and English markets to be in active competition for European beet sugar, is a comparatively new feature, and will mean an advance of several shillings per cwt. upon present values.

The market for refined sugars shows no improvement; the large shipments of American bounty-fed refined sugars are affecting seriously our refiners.

American granulated is quoted here at 19s. c.i.f., whilst the price of the same sugar in New York is 6½c. per lb.—that is, 31s. per cwt.; so that the American wholesale grocer is paying 12s. per cwt. more than the English wholesale grocer is paying for their own and the same sugar!! The United States Government have remitted in drawbacks to their refiners from Jan. 1 to May 31 quite £100,000 in bounty, which is 2s. per cwt. all out. If we add this 2s. to the 12s., and to both, the retailers' profit, it brings up the difference to fully 16s. per cwt., or 1½d. per lb. as between the English and American consumer.

On the 20th June, the deliveries in the United Kingdom show a decrease, as compared with the same period of 1884, of 8,556 tons; and the imports show a decrease of 13,080 tons.

The imports of American refined for the five months ending May 31st, 1885, were 48,988 tons, against 12,653 tons in 1884.

The stocks on the 20th June in the United Kingdom were 309,687 tons, against 290,521 tons in 1884, and 248,380 tons in 1883.

Present quotations for the standard qualities, as under, are:—


FLOATING.		Last Month.
Porto Rico, fair to good Refining	16/- to 16/6 against	15/6 to 16/-.
Cuba Centrifugals, 96% polarization	18/3 to 18/6 ..	17/- to 17/3.
Cuba Muscovados, fair to good Refining ..	16/- to 17/- ..	15/6 to 16/-.
Bahia, middling to good Brown, No. 7 to 8½	13/6 to 15/- ..	12/6 to 14/-.
Pernambuco, good to fine Brown	15/6 to 15/9 ..	14/6 to 14/9.
Java, No. 14	19/- to 19/3 ..	18/- to 18/3.
LANDED.		Last Month.
Madras Cane Jaggery	11/6 to 12/- against	10/9 to 11/3.
Manilla Cebu and Ilo Ilo	11/6 to 12/- ..	10/9 to 11/3.
Paris Loaves, f.o.b.	20/6 to 21/- ..	19/- to 19/6.
Titlers	21/6 ..	21/6
Tate's Cubes	23/- ..	23/3
Austrian-German Beetroot, 88% f.o.b. ..	16/- to 16/3 ..	16/3

THE SUGAR CANE.

No. 193.

AUGUST 1, 1885.

VOL. XVII.

 The writers alone are responsible for their statements.

N.B.—All communications to be addressed, and Cheques and P.O. Orders made payable to HENRY THORP, Ducie Chambers, 57, Market Street, Manchester.

For Scale of Charges for Advertisements, see page xi.

For Table of Contents, see opposite the last page of each Number.

ERRATA.—July number, page 339, 5 lines from bottom, for M. 2-60, read 2-06.

We are compelled, for want of space, to hold over until next month several articles of interest, as well as our usual Monthly List of Patents.

At page 407 we give a letter addressed to the Marquis of Salisbury, by the West India Committee, on Mr. Scott's report on the German Sugar Bounties, with an appendix (page 413), showing the bounties, as they make them to be, for the years 1875-76, 1878-79, 1880-81, 1882-83, 1883-84, and 1884-85.

At page 416 we give the remaining portion of Mr. Scott's report. In our last number we gave a statement showing the bounty for 1883-84 to be more than double (2s. 0 $\frac{3}{4}$ d. against 11d. per cwt.) the amount which Mr. Scott stated it to be. It appears that Mr. Scott's figures were based upon the year 1882-83, the latest completed returns at the time of his making his report, which will account for a portion of the discrepancy between the two estimates. We have reason to believe that the matter is receiving some attention at head-quarters at Berlin.

American refined sugars keep pouring in. In the month of June the imports were upwards of 24,000 tons—a total exceeding in amount the utmost outturn of our London refineries, all put together. Our refiners' committee have addressed a letter to

Lord Salisbury (see page 399) on the subject of the American bounty on the exportation of sugar. By this bounty of 2s. per cwt. the American refiners are able to dispose of their surplus production at a handsome profit, and, at the same time, to keep up the price in their own country. The American consumer, by the operation of the bounty system, not only has to pay more for the sugar he consumes, but has had to pay £150,000 in bounties upon sugars shipped to Great Britain from January to June, 1885.

A balance sheet is the best indication of the state of business. In 1883 (see *Sugar Cane* for 1883, pages 394 and 450) we gave a list of German sugar companies which had declared good dividends — one of them as high as 96 per cent., and another 50 per cent., several of them ranging from 20 to 30 per cent. 88 per cent. beet was then from 5s. to 6s. per cwt. higher than it is now, and about double the price it was last January. The following statement, showing the position of matters, taken from the *Deutsche Zucker-industrie*, will surprise no one :—

The balance sheet of the Wierchoslaw Sugar Factory for the year ending April 30, 1885, shows a loss of M. 149,634 (£7,481). The quantity of roots worked up was 699,970 cwt.

Another factory at Wurthe, after writing off £800 for depreciation of plant and machinery, cannot declare a dividend.

The factory at Mödritz, which for 1883-84 showed a net gain of 53,776 florins (£4,481), has lost 50,000 florins (£4,000) for the campaign 1884-85.

The Gronau (Westphalia) factory worked up 616,140 cwt. of beets in the last campaign, paying on the average 73½ pf. per centner for its beets, and gained M. 82,429 (£4,121), of which M. 80,696 (£4,035) were written off the small balance carried forward.

The balance sheet of the Süderdithmarsch factory, which is in liquidation, shows a loss of M. 170,673 (£8,535).

The Weitzen (Hanover) factory worked up 551,900 cwt. of beets, and, after its two years working, comes out without gain or loss.

The Anklam factory shows a net gain on 459,762 cwt. of beets of M. 45,195 (£2,260), which was all written off.

We would again call the attention of our contributors to the desirability of sending in their papers, early in the month; when received later than the 15th they stand a chance of being held over until the following month.

SUGAR REFINING BY ELECTRICITY.

In the March *Sugar Cane*, page 116, we called attention to a Company which had just been started in New York for refining sugar by electricity; and we also gave a report, taken from a contemporary, of some sugars which had arrived in this country, and which, it was stated, had been refined by this process. We gave the account as a curiosity—no more believing it, than if we had been told that some one had arrived in Liverpool that morning, having left New York the previous day in a balloon.

Experiments with this new process have continued to be made, with results, as reported, which are simply astounding.

Within the last few days we have seen Mr. Robertson of Liverpool, who is interested in this Company, and represents it in England. No one, we think, can converse with this gentleman, without being persuaded that he most thoroughly believes in this invention, and that it really does what is reported of it.

He told us that a gentleman in New York, in order to test the matter, had 3 cwt. of raw sugar taken to the inventor's room, for the purpose of being refined; he satisfied himself that there was no other sugar in the room except that which he had brought with him, and that there was no way by which the sugar could be replaced, except through the door, which he had securely fastened and sealed upon leaving. Within two hours he re-entered the room—during his absence the raw sugar had been passed through the machine by the inventor, and converted into refined sugar, the weight returned being within 1 per cent. of the saccharine contents of the raw sugar.

An experiment upon a much larger scale has within the past three weeks been made, under conditions set forth in Mr. Robertson's Circular, dated July 17, which we give at page 489, together with the report of the five gentlemen who were selected to certify to its genuineness; we notice that two out of the five gentlemen are the president and vice-president of the company. Assuming, as we do, that all is perfectly square, we think the

company would have done better to have obtained the services of five well-known gentlemen who were perfectly disinterested.

The quantity of raw to be refined was 80 bags—producing 40 barrels of refined sugar of “12 different sizes, from the finest granulated up to about the size of a small bird’s egg;” the time occupied in the process was seven hours. These gentlemen did not witness the operation itself, but they conclude their report as follows: “We have no reason whatever to doubt that the aforesaid refined sugar was produced by the said (Professor) Friend by his said process on the said 14th July from the aforesaid raw sugar.”

The conclusion that one is driven to, with this information before us, is, that it is either a great fact, or it is a great fraud. The company are about starting some works to refine, by this process, 500 tons per day. We shall therefore know in a little while which of these conclusions is the correct one.

IF IT IS A FACT, it means that we are on the eve of a revolution in sugar refining, without a parallel in its history; it means that planters in all parts of the world can, if they choose, and have the capital, refine their own sugars on the spot. It opens up, besides, a market for refined sugar with millions of people in India, who, from a religious belief, are now debarred from its use on account of the animal charcoal employed in refining under the old system.

The particulars of the invention may be stated to be as follows:—

“The process is an electro-chemical one, which is worked by a machine, automatic in its action to a very great extent. Boiling and animal charcoal are entirely dispensed with. No syrups nor soft sugars of different grades are produced, the entire product being hard sugars in whatever forms or sizes which may be desirable to produce, that is, from finest powdered up to and including cut and pressed loaf. One valuable feature in this mode of manufacture is, that all the saccharine matter in raw sugar, whether crystallisable or uncrystallisable under the old system of boiling and filtering, is by this system rendered into hard sugar, with a small fraction of a loss,—less than one per cent. of the whole quantity. The cost of refining by this process is 3s. 4d. per ton (2d. per cwt.), and the time occupied not more than four hours.”

By the favour of Mr. Robertson we have been furnished with samples of sugar refined by this process, and which are at our office, 57, Market Street, Manchester, for inspection.

SUGAR NOTES: No. 3.—ISOMERIC SUGARS.

By DR. T. L. PHIPSON, F.C.S., &c.

The subject of isomeric sugars has become one of considerable importance to planters and refiners—in fact to everyone who is connected at all with that extensive branch of practical chemistry comprised under the term “Sugar.”

By isomeric substances we understand certain compounds, which, although they give precisely the same composition to analysis, possess nevertheless different properties. In organic chemistry we have a number of examples of this, though they are by no means so numerous as many writers would induce us to believe. One of the most striking examples is supplied by comparing together acetic ether and butyric acid. On 100 parts these two compounds yield to analysis exactly the same amounts of carbon, hydrogen, and oxygen; yet acetic ether and butyric acid are totally distinct substances, possessing very different properties, obtained by different processes, and whose market value is very different, acetic ether being quoted about six shillings a pound (of 16 ounces), and butyric acid one shilling an ounce. Of course attempts have been made to explain these cases of *isomerism* (equal measures) by having recourse to the atomic theory, but it is not our intention to follow up that part of the subject.

The class of compounds to which the various kinds of sugar belong has been known for some time to afford a number of examples of isomerism. Of late years sugars have been discovered which present the same composition in 100 parts as cane sugar, but which have little taste (mellitose), or no taste at all (pinite). Glucose is another familiar example of a substance which is isomeric with saccharose (cane sugar), but whose properties are widely different.

Betose (or Beetroot Sugar) appears to occupy a position about half-way between saccharose and glucose, in the same manner that lactose (or milk sugar) has been looked upon as a connecting link between the glucose groups and the saccharose groups in general.

But, it must be remembered, this classification into groups is effected for the sake of facilitating study. In reality these various compounds by their physical, chemical, and organoleptic properties pass gradually one into the other, and in nature, that is in the plants in which they are found, one may be converted into another, although such conversion may not yet have been realised in the laboratory.

From a practical point of view we know that all these sugars are essentially different, and the more they are submitted to careful study, the greater this difference will appear.

It is only within a comparatively short time that practical chemists have begun to realize these differences. In some of our most recent text-books we find it stated that beet sugar (betose) and cane sugar (saccharose) are perfectly identical. But there is no cook who has made preserves with one and the other who will not deny this assertion most flatly. And now that practical chemists have taken the matter up, they have come to the conclusion that betose is inferior in sweetening powers to saccharose, and as these two sugars polarize alike, or nearly alike, it has come to light that the polariscope is not a suitable instrument for testing the value of a sugar in regard to its sweetening power.

This is a very important subject, and will doubtless be followed up. It has been often asserted that "tastes differ," but in this case it appears that preserves cannot be made so well with beet sugar as with cane sugar, which points to the fact that, under the influence of the acid of the fruit, betose shows a greater tendency than saccharose to pass into the state of glucose. In a little while, probably, other features will arise showing that refined betose and refined saccharose are two distinct products. What we require at the present time, in order to solve this question completely, is a careful set of experiments on the subject. Betose and saccharose may be very similar in many respects, but nevertheless far from identical.

There is an experiment which would establish at once the difference between betose and saccharose, even in the hands of those who might be prejudiced to some extent in favour of one or the other. Here it is: Take equal weights of betose (pure refined beet-root sugar) and saccharose (pure refined cane sugar), dissolve them in 30 parts of water, add 5 per cent. of the weight of the sugar of a mixture of *tartaric* and *citric* acids; place the two tubes or flasks containing the solutions in a water bath at 100° centigrade for the space of one hour exactly, and then determine accurately the amount of *glucose* formed in each case.

If I mistake not this experiment will go far to place the question of a difference between these two sugars beyond all doubt.

THE BOUNTY ON EXPORTATION OF REFINED SUGAR FROM THE UNITED STATES.

The following letter has been addressed to Lord Salisbury by the Chairman of the British Sugar Refiners' Committee :—

9, Mincing Lane, 13th July, 1885.

The Most Hon. the MARQUIS OF SALISBURY, K.G.,
Secretary of State for Foreign Affairs.

My Lord Marquis,—I am desired to call your Lordship's attention to recent correspondence with the Board of Trade in reference to the exportation of refined sugar from the United States.

In March, 1883, the duties on sugar entering the United States were reduced, the reduction coming into operation on the 1st of June of that year. The new Tariff Bill did not, however, state what reduction would be made in the drawback allowed on the exportation of refined sugar.

On a former occasion, in 1875, when a change took place in the American tariff in reference to sugar, a drawback on refined was established which proved to be too high as compared with the duty on raw. The result was a large increase in the exportation of refined sugar from the United States, and its sale in this country at a price below the cost of production. We furnished proofs that this drawback was excessive, and eventually the United States Government was induced to make a careful examination of the subject, when it was found, as stated in a U.S. Treasury Memorandum of September 5th, 1877, "that the rates of drawback were more than the duty paid by importers on the raw sugar used in the manufacture of refined sugar, and amounted to a bounty and an actual loss to the Government of a very large sum." The drawback was therefore reduced and the artificial competition at once ceased.

We were naturally anxious to avoid a repetition of this serious hindrance to our trade, and our Secretary, therefore, immediately on the promulgation of the new tariff in March, 1883, waited on Mr. Giffen to point out to him these facts and to ask that Her Majesty's Government would be good enough to obtain early information of the new rate of drawback. A letter was subsequently, on the 25th April, 1883, addressed to the President of the Board of Trade with the same object, to which Mr. Giffen replied on the 30th of that month.

On the 11th July, 1883, we received the desired information in a memorandum from the U.S. Treasury Department dated 19th June, which gave the new provisional rates of drawback, and stated that a Commission would consider the subject of new permanent rates.

It was at once apparent that the provisional rates of drawback were too high, and I therefore lost no time in furnishing the Board of Trade with a memorandum in proof of this,* requesting that it might be communicated to the United States Treasury Department for the purpose of being placed before the Commission. Shortly afterwards I forwarded a further memorandum,† showing that the provisional drawback gave a bounty of about two shillings per hundredweight, and requested that it also might be communicated to the United States Treasury Department, with the view of its being placed before the Commission which was about to consider the subject of new permanent rates of drawback.

Mr. Sackville West, Her Majesty's Minister at Washington,‡ in acknowledging the receipt of the first memorandum, submitted to Lord Granville that in his opinion it would be better to ascertain the nature of the proposals which the Commission were considering, with the view of fixing permanent rates, before taking further steps in the matter. My second memorandum was consequently sent to Mr. Sackville West without instructions to communicate it to the Commission.

From our former experience in this matter we were strongly impressed with the necessity, in the interests of the sugar refiners of this country, of putting the American Commission in possession of accurate figures in reference to the proposed drawback without a moment's delay. I therefore wrote to the Board of Trade at once,§ pointing out that my memorandum contained information which might be useful to the Commission in arriving at correct drawbacks, and urging that as the present drawbacks had been communicated by the United States Treasury Department to Her Majesty's Minister at Washington with the statement that they were provisional, and that a Commission would consider the subject of new permanent rates, the present would appear to be the most proper and opportune time for furnishing the United States Treasury Department with our

* 13th July, 1883. † 22nd August, 1883. ‡ 13th August, 1883.

§ 13th September, 1883.

remarks on the subject. In fact, our memorandum was useless unless communicated at once to the Commission.

Mr. Sackville West, in a second despatch to Lord Granville,* stated that a special agent had been appointed to examine the question, and was engaged in his work. Mr. West considered this a good reason for continuing to withhold our memorandum, until he could "ascertain the general views of the Treasury Department on the subject of fixed rates."

This delay continued until Mr. Sackville West received † from the Secretary of the United States Treasury a circular announcing that the provisional rates of drawback would continue in force until 1st January, 1884.

The United States Treasury Department, being still without the information which we were so anxious that they should receive, had thus partially confirmed the objectionable rates of drawback; and Mr. Sackville West then ‡ wrote to say that he proposed to put himself in communication with the Commission and make such use of the two memoranda as he might find expedient in the interests of those concerned.

Mr. West's next despatch § indicates that he had not, in the meantime, communicated the two memoranda, and that, in fact, as we had too much reason to fear, his delay of three months had allowed the opportunity to slip, the Commission having already concluded its labours.

Our two memoranda were dated 13th July and 23rd August, 1883, and it was not until October that it was decided to continue the drawbacks till the end of the year. Mr. West then, for the first time, moved in the matter, by making inquiries at the Treasury Department "as to the action which might be taken with regard to fixing the sugar drawback rates," and was informed that the report and recommendations of the Commission had not yet been submitted to the Treasury, the matter being then under the consideration of the chief of the Customs division. This information was not communicated to us, and we were therefore still under the impression that Mr. West was carrying out his intention of putting himself in communication with the Commission and making such use of the two memoranda as he might find expedient.

* 28th August, 1883. † 3rd October, 1883. ‡ 9th October, 1883.

§ 27th October, 1883.

We heard nothing further for four months, when, on the 25th February, 1884, we were informed, as we too much feared, that the provisional rates of drawback were permanently maintained.

I wrote at once to the Board of Trade, on the 8th of March, 1884, pointing out the various steps in the correspondence, which had closed by our being informed that Mr. West was about to put himself in communication with the Commission and make such use of the two memoranda as he might find expedient, and requested to be informed of the result of this action taken by Her Majesty's Minister at Washington. We were informed, in reply, that all the reports received from Her Majesty's Minister at Washington had been communicated to us.

I wrote again, on the 3rd April, that we naturally desired to learn the result of Mr. West's communication with the Commission, and I pointed out that we had been most anxious, as indicated in my former letters, that the two memoranda should reach the United States Treasury Department, or the Commission, while the question of permanent rates of drawback was under consideration, it being of the utmost importance to the sugar refiners of this country that they should not have to compete against an export bounty in the United States in addition to those with which they have already to contend. I added that this anxiety was not unfounded, the new drawback having already resulted in the exportation of refined sugar from the United States to this country at prices with which it would be difficult to compete.

In response to this appeal the Board of Trade* asked Lord Granville 'to instruct Mr. Sackville West to report fully the result of his action in placing himself in communication with the Commission appointed to consider the subject of sugar drawbacks in the United States.' Mr. West's reply† was that the decision of the United States Government permanently to maintain the provisional rates of drawback rendered any further step useless.

This quite confirmed our view, that the only use of our memorandum was to furnish information to the Commission during its examination of the question of the proper rate of drawback. The withholding of the information till after the Commission had concluded its labours has involved the sugar refining trade of this country

* 16th April, 1884. † 1st May, 1884.

in a bounty-fed competition which promises to be even more disastrous than that through which they have already passed.

I need hardly trouble your Lordship with the subsequent correspondence on this *fait accompli*. In acknowledging* the receipt of the reply to our inquiry I naturally pointed out that the memorandum which had been in Mr. West's hands for more than three months before it was communicated to the American Government was evidently received by them too late to influence the decision of the Treasury Department. I then stated the effect of this new bounty in enormously increasing the importations of American refined sugar, and concluded by expressing the hope that Her Majesty's Government would make such representations to the United States Government as might lead to a reduction in the drawback similar to that which took place in 1877. The reply of the Board of Trade† was a long and interesting letter, but did not supply any practical solution of our difficulties.

Since the receipt of that letter in August, 1884, things have got rapidly worse. The importations of American refined sugar, under the stimulus of this bounty, have increased as follows:—

	Tons.
Average Monthly Imports, 1882, previous to the bounty	195
Average Monthly Imports, 1883	520
„ „ 1884	4,348
„ „ 1885	12,190
Imports in April, 1885	12,957
„ May, 1885	20,399
„ June, 1885	24,157

The quantity now imported is more than all the white sugar produced in the London refineries, and must, if continued, lead to the closing of many of our works.

On the 1st of June last I wrote to the Board of Trade informing them of a report that a commission had again been appointed by the Secretary of the United States Treasury to inquire into the drawbacks on sugar, and requesting that Her Majesty's Minister at Washington might be again instructed to communicate our memoranda of 13th July and 23rd August, 1883, to the United States Government for the information of this new commission. I venture to hope that on

*8th July, 1884. † 12th August, 1884.

this occasion no opportunity will be lost of furnishing correct information during the examination of the subject by the commission.

The Board of Trade, in their letter to the Foreign Office of 12th August, 1884, say that they "do not think it desirable that formal representations should be made to the United States Government, as that Government, if it is proved that bounties are really given by its legislation on the subject, will probably be anxious to do away with them." They add that they "believe that in any case representations should only be made in such a way as to induce foreign governments to act from reasons of self-interest."

In reference to these remarks, I venture to submit that we have always acted on that principle. We have, indeed, pointed out to Her Majesty's Government the injury done to the trade in order to justify our complaint, but the only action we have asked to be taken in the matter is the communication to the United States Government of a few plain calculations showing that the present drawback gives a bounty, and therefore incurs a loss to the Treasury, of two shillings per hundredweight. This was putting the matter entirely from the point of view of their own self-interest, and I quite concur with the Board of Trade in thinking that if the United States Government had been in possession of this information at the proper time they would probably have been anxious to do away with the bounty.

Again, in their letter to us of the same date, the Board of Trade say that "it does not appear that the United States Government have intentionally given a bounty on the export of refined sugar, their policy on former occasions having been to prevent any bounty being given." Here again we concur, and it was for this very reason that we thought it so desirable, and so reasonable to furnish the United States Government at the earliest possible moment with accurate information on the subject.

In this we were also influenced by our experience on the former occasion referred to by the Board of Trade. In 1875 an excessive drawback was established, and although an official enquiry was held the information furnished, which naturally emanated from those interested in the maintenance of the drawback, led the American Government to suppose that the drawback was correct. It was only after two years of troublesome agitation that the American Government was induced to reconsider the question and examine the calculations which we had furnished. The drawback was then reduced to its proper

amount. The same thing has evidently happened on this occasion, and it was this that we were anxious to avoid by asking that our calculations might be furnished to the American Government without delay.

On the general question of foreign bounties on the exportation of refined sugar I would respectfully point out to your Lordship that Her Majesty's Government have for twenty years shown how much they object to them by constantly endeavouring to obtain their abolition. In these negotiations they have met with a certain amount of success, so that, had not new bounties appeared in other quarters, we should by this time have enjoyed considerable relief. In 1879 and 1880 a Select Committee of the House of Commons examined the whole subject and made certain recommendations to which I would venture to direct your Lordship's attention.

I am, my Lord Marquis,

Your obedient servant,

(Signed) JAMES DUNCAN,

Chairman, British Sugar Refiners' Committee.

The following letters have been received by the Sugar Refiners' Committee from the Board of Trade in reference to the letter addressed to that Department on the 1st June. (See July *Sugar Cane*, page 351):—

Office of Committee of Privy Council for Trade,

14th July, 1885.

Sir,—With reference to Mr. Martineau's visit of Saturday last, I am directed by the Board of Trade to inform you that your letter of the 1st ultimo, on the subject of the export bounty on sugar given by the United States Government, has been communicated to the Foreign Office with a view to its transmission to Her Majesty's Minister at Washington. As soon as a reply has been received, a further communication shall be made to you.

I am to add that the Board regret that an acknowledgement of the receipt of your letter was not sent when that letter was received.

I am, Sir, your obedient Servant,

ALLEN STONEHAM.

J. Duncan, Esq.,

Chairman of the British Sugar Refiners' Committee,

9, Mincing Lane, E.C.

Office of Committee of Privy Council for Trade,
21st July, 1885.

Sir,—With reference to the letter addressed to you from this Department on the 14th instant, and also to your communication of the 1st ultimo, on the subject of the drawbacks given by the United States Government on the exportation of refined sugar, I am directed by the Board of Trade to inform you that they have now received through the Secretary of State for Foreign Affairs a Despatch from Her Majesty's Minister at Washington reporting as to the present position of the matter. Sir L. S. West states in his Despatch that Mr. Manning, the present Secretary of the United States Treasury Department, appears, immediately upon his appointment, to have taken up the question of these drawbacks by the nomination of a Commission, which Sir L. S. West has reason to believe is now considering the subject in connection with the memorandum thereon which he had submitted to Mr. Manning's predecessor.

I am at the same time to forward to you the accompanying copies of a Report on the Sugar Industry of the United States which have been received from Sir L. S. West, and which it is hoped may be useful to your Committee.

I am Sir, your obedient Servant,

HENRY G. CALCRAFT.

J. Duncan, Esq.,

Chairman of the British Sugar Refiners' Committee,
9, Mincing Lane, E.C.

STRONTIA.

The following company has recently been registered under the Limited Liability Act:—

Objects: To acquire from Messrs. Bolton and Partners, Limited, mines and deposits of strontia and baryta held by them, and the manufactories known as the Heworth Chemical Works at Gateshead-on-Tyne and at Lavenham in Suffolk. Capital: £300,000 in £1 shares. Signatories (with one share each): H. A. Bass, M.P., Burton-on-Trent; F. Bolton, 19, Grosvenor Gardens; W. E. J. B. Farnham, Loughborough, Leicester; F. S. Archibald, M.P., 116, Queen's Gate; J. Hick, Whatley, Lancashire; R. H. Mileward, 1, New Square, Lincoln's Inn; P. A. Schotchery, 4, The Sanctuary. Number of directors not more than nine nor less than three. Qualification: The holding of 1,000 shares. Remuneration: Six guineas for every board meeting attended. Registered by Bolton, 4, The Sanctuary, S.W.

LETTER FROM THE WEST INDIA COMMITTEE TO THE
MARQUIS OF SALISBURY, UPON MR. SCOTT'S
REPORT ON THE GERMAN SUGAR BOUNTIES.

West India Committee, 51, Lime Street, E.C.,
London, 10th July, 1885.

The Most Honourable the MARQUIS OF SALISBURY, K.G., &c., &c.,
Secretary of State for Foreign Affairs.

My Lord,—The report of Mr. Charles S. Scott* on the Bounties on Raw Sugar exported from Germany, forwarded by Sir E. B. Malet to Earl Granville in November last, but only printed in a parliamentary paper recently issued (No. 39, May, 1885), has been considered by the West Indian Committee, and we desire to submit to your Lordship the following observations:—

This report in its main features seems based upon the report of the Commission appointed by the German Government in 1883, to inquire into the falling off in the revenue from the beet-tax, and the means to be adopted for its correction. But as the Commission was composed to a considerable extent of persons practically interested in the sugar industry of Germany, its conclusions do not possess the authority that would belong to a thoroughly impartial and independent inquiry.

Mr. Scott (page 38, parliamentary paper)† points out that the German Government were so far from contemplating an export bounty, that they intentionally limited the amount of drawback to the amount which the experts considered had been actually paid in excise on the roots required for the lowest standard of raw sugar produced for export, and at 60 pf. less than the estimated tax paid by one centner of raw sugar of 93·75 per cent. polarization. This was the assessment of 1869, but Mr. Scott admits that since that time, by improvements in manufacture, the payment of the full tax contemplated by the legislature has been evaded, and unintentional bounties on the export of sugar have been secured. This admission by Mr. Scott fully justifies the complaints which have been addressed to Her Majesty's Govern-

* The first part of this report appeared in our July issue, pages 369 to 381, and the remaining portion we give this month, pages

† July *Sugar Cane*, page 370.

ment in recent years on the subject of the German bounties by the representatives of the British Colonial Sugar Industry. These bounties, which notoriously exist, as Mr. Scott says, entail considerable loss of revenue to the Imperial Government, and yet he states that there is no probability of any legislative change at present, declaring that to effect such change "in the face of the present crisis would be to run the risk of intensifying the crisis and spreading ruin among a large class of raw sugar manufacturers." While we quite agree with Mr. Scott that the abolition of the bounty would ruin many of the German manufacturers, it would probably entirely put an end to a crisis which has existed for some time, and which must continue to exist so long as bounties are allowed to continue.

In estimating the bounties, however, Mr. Scott follows the evidently biassed opinion of the majority of the Commission in attributing the overproduction to the following causes:—

1. Want of storage room for sugar in Germany.
2. Small profits of other farming operations.
3. Foreign demands, notably that of England.

It is difficult to conceive how any one can seriously advance the the first and third of the above reasons as causes of over production. It is, of course, quite natural to suppose that persons interested in a protected trade should affirm that protection does not lead to overproduction, although we were little prepared to find Mr. Scott give his sanction to that view. It is easy to show that the bounties have had more effect in stimulating production than any other cause—this is, indeed, practically admitted by Mr. Scott, for he points out that the "growers are backed in many instances by machine manufacturers, who have benefitted largely by the industry, are at present stimulating and even forcing the sugar manufacturers to extend their business, and are occasioning the erection of new sugar factories, many of which are so-called farmer's factories (*bauernfabriken*), set up and working with borrowed capital and machinery only partly paid for."

Under this system the power of production has risen from 409,415 tons in 1879–80 to 1,150,000 tons in 1884–5, whilst the power of consumption has only risen from 281,514 tons in 1879–80 to 380,000 tons in 1884–5, and the exports during the same period have risen from 134,486 tons in 1879–80 to 770,000 tons in 1884–5. (The figures for 1879–80 are Mr. Scott's. Those for 1884–5 are Mr. Licht's.)

As will be shown hereafter the increase in export from Germany in 1882-3 to 1883-4 was 128,000 tons, and from 1883-4 to 1884-5 a further increase of 163,000 tons took place, showing an increased export power in two years of 291,000 tons, the enormous pressure to sell which caused the price to fall at a panic rate to several pounds sterling per ton less than the cost of production. Had the large foreign demand, notably that of England, been the cause of this immense increase, of course there could have been no reason for the price to fall below the cost of production.

The chief cause of the overproduction is doubtless that to which Mr. Scott seems to attach little importance, viz., that the bounties made the sugar industry so profitable that a fictitious price has been paid for roots, and hence their cultivation has been stimulated so greatly beyond what would, under natural conditions, have been the case.

Mr. Scott further proceeds to show the decrease in the Government revenue, caused by the bounties, and he takes as the period showing the highest average of income the years 1874-9, when the average amount netted by the Government (after deducting drawbacks and cost of collection) was M. 49,462,182 and in the last three years, 1880-3, the amount netted

was	42,245,060
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	Mks. 7,217,122
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The former period representing an income of m.1.15 per head of the population and the latter period m.0.93.

Mr. Scott does not clearly distinguish between a tax of m.1.15 per head and a Government income of m.1.15 per head of the population. He continues, "assuming for the next three years, a population of 46,500,000 a tax of m. 1.15 per head ought to produce m.53,500,000," whereas it is now known that the actual income for 1883-4 was only m.27,314,615, and from the figures just officially published, it appears certain that the Government income for 1884-5 will not exceed m.22,235,697 from this source.

Taking an average of five years, as Mr. Scott does, the enormous reduction in revenue is hardly shown, as it is only since the exports have become so immense during the last few years that the falling off has assumed such large proportions.

The following statement shows what the Government revenue,

exclusive of customs duties has been, year by year for the ten years, 1875-6 to 1884-5, the last year being estimated only (cost of collection deducted):—

M.	M.
1875-6 54,068,456	1880-1 43,500,282
1876-7 43,684,071	1881-2 38,705,520
1877-8 45,165,710	1882-3 47,917,045
1878-9 45,786,948	1883-4 27,314,615
1879-80 49,049,384	1884-5 22,235,697

As to the extent of the bounty, Mr. Scott says that in 1880-81, 73 out of 333 factories in 1881-2, 264 out of 343 factories, and in 1882-3, 256 out of 358 factories obtained a bounty of m. 1·40 per cwt. of sugar, equal to £1 8s. per ton. In 1882-3 the exports in raw sugar were 472,551. Assuming that in 1882-3 those 256 factories obtaining this bounty exported their fair proportion of sugar, then as 358 : 256 : 472,551 : 336,517 at £1 8s. per ton = £471,124. Taking, however, the whole of the sugar exported in 1883 it is evident that the bounty amounted to £590,797 for 8,747,154 tons roots gave 835,165 tons of raw sugar = 10·48 tons roots to one ton sugar—the bounty was consequently £1 4s. 7d. per ton on the total exports, viz., 472,551 tons raw sugar, and amounted to £590,797, as above stated.

In 1883-4, taking the figures officially published by the German Government, 8,896,711 tons of roots gave 986,403 tons of raw sugar, 9·02 tons to 1 of sugar—the tax being 16 marks per ton of roots, a ton of sugar requiring 11·25 tons roots to make it would have paid m. 180—but 9·02 tons roots only pay m. 144·32 = bounty m. 35·68—£1 15s. 8d. per ton of sugar, and the total bounty paid by Government £1,083,679.

In 1884-5, according to Mr. Licht's estimate, 10,475,000 tons roots yielded 1,150,000 tons sugar = 9·11 beet to 1 sugar—the bounty, £1 14s. 2d. per ton, and the total bounty paid, £1,316,700. But when it is borne in mind, as is shown already by Mr. Scott (p. 45)* that the selling price of sugar in Germany is that of the English market, plus the drawback, it will be seen that the German consumers also pay a bounty equivalent to that paid by the Government on every ton of sugar they consume, thus, as is estimated above, the bounty obtained by the sugar industry in 1884-5 on 770,000 tons of sugar exported will amount to m. 26,493,334, and on 380,000 tons consumed in Germany about m. 13,000,000.

*Or page 416 of this No.

It will be seen that the calculations in the appendix hereto showing the extent of the bounty are not based on the same figures as those taken by Mr. Scott, but are arrived at by dividing the quantity of sugar made into the quantity of beet employed, thus including the molasses sugar made, which, according to Mr. Licht, in 1883-4 amounted to 30,000 tons—the drawback on which is all bounty. It may be explained here that molasses sugar is made in factories especially erected for that purpose from molasses bought duty free—these factories are not under the supervision of the Revenue Department, and the sugar so made is not included in the Government returns of sugar made in the sugar factories proper.

Mr. Scott shows that from 1877-82 the average yield in roots per hectare was 27,300 kilos—equal to 11 tons per acre, and as we have shown that the bounty in 1882-3 was £1 2s. 11d. per ton, and 10·32 tons roots required for one ton sugar, the bounty was per acre £1 6s. 1d. In 1883-4, 12·30 tons of roots were grown per acre; as only 9·02 tons roots were required for 1 ton sugar, and the bounty was per ton of sugar £1 15s. 8d., the bounty per acre was £2 12s. 8d. In 1884-5, at a bounty of £1 14s. 5d. per ton sugar, 9·10 tons beet being required to 1 ton sugar (assuming the same yield per acre, the figures not being yet published), the bounty was per acre £2 5s. 10d.

As to the statement that the small profits obtained from agricultural operations other than beet growing, caused by imports of grain and cereals from America, it would appear that in Germany opinions differ. On the 26th January last, during the discussion on the Budget proposals in Parliament, Herr Dirichlet said:—"I have done my best in speech and writing to warn my fellow countrymen in East Prussia from being induced by the brilliant results of some factories to tread this dangerous path (beet sugar production), and for my pains have been called a pedant and an evil prophet. To say that the over-production is no consequence of the fiscal system is strongly opposed to what the minister said in the Prussian Chamber of Deputies a few days since when he expressed his undivided satisfaction at the ruling position of Germany in the sugar market of the world, for he who rules must be responsible for consequences." The speaker continued to show that on the average of the last five years the grain production would compare in profit with any previous five years; that cattle rearing until the last two or three years had been three times as profitable as formerly—that horses, which 28 years ago fetched 240

mks. now yielded 500-600 mks., and he concluded by energetically disputing that over-production of sugar had been caused by unprofitable cultivation of grain. This view was largely confirmed by Herr Nobbe, the next speaker.

If the Government were in earnest in taking measures to abolish the bounty, they would either reduce the drawback to the level of the tax paid on the beet required to produce one ton of sugar, or they would permit manufacture in bond, as in France. The former course was suggested by the Commission above mentioned in their report, but was not adopted in consequence of the distress caused by the crisis; but, instead of that, the Government added to the bounty by granting to the manufacturers three months longer time in which to pay their duties. The expert, Mr. Herbertz, mentioned by Mr. Scott, in the *Deutsche Zucker Industrie* for 1884, page 1008, showed that a considerable reduction, both in duties and drawbacks, would, by largely increasing the home consumption, give the Government the revenue they require from this article.

We append calculations showing how the falling off in revenue may be accounted for during 1875-6, 1878-9, 1880-1, 1882-3, 1883-4, 1884-5.

It is evident, in conclusion, from what has been stated, that the bounties for 1883-4 must, according to the official data, have amounted to £1,755,555, and for the year 1884-5 to £1,987,000. Whilst, therefore we cannot accept to the full extent the statements in regard to bounties made in Mr. Scott's report, we have shown that it was but natural he should not have arrived at the full truth in view of the sources from which alone it was open to him to obtain his information; we readily recognise the ability displayed in dealing with materials of a complicated character connected with a notoriously intricate subject, and we feel confident that when Mr. Scott sees the official returns for 1883-4 and 1884-5, he will be the first to admit that the bounties are of far greater importance than he has been led to believe.

I have, &c.,

N. LUBBOCK,

Chairman West India Committee.

APPENDIX.

1875-76.

CALCULATION SHOWING FALLING OFF IN REVENUE CAUSED BY BOUNTIES IN
EXCESS OF LEGITIMATE DRAWBACK.

1875-6. Duty and drawback based on proportion of 11·75 tons of beet required to produce one ton sugar, whereas 4,161,284 tons roots gave 346,646 tons sugar = 12 tons beet to one ton sugar.

Duty on roots at 80 pf. per cwt gave	M.66,580,547
Exports in raw sugar value gave a total drawback of	10,259,091
Deduct for cost of collection 4 per cent. on 66,580,547	2,663,222
Government Income	53,658,234
	<u>M.66,580,547</u>

Total make 346,646 tons.

Exports raw sugar 54,570 ,,

Home Consumption 292,076 tons.

There was a loss to manufacturers on the drawback on the sugars exported of 4 marks per ton, or in all M.218,279.

1878-79.

CALCULATION SHOWING FALLING OFF IN REVENUE CAUSED BY BOUNTIES
IN EXCESS OF LEGITIMATE DRAWBACK.

1878-9. Duty and drawback based on proportion of 11·75 tons of beet required to make 1 ton of sugar. Whereas, 4,622,900 tons roots gave 420,684 tons sugar = 10·99 tons beet to 1 ton sugar.

Duty on roots, at 80 pf. per cwt., gave.....	M.74,059,963
Exports in raw sugar value gave a total drawback of	
M.26,366,267, as 11·75 : 10·99 : M.26,366,267 : bounty..	1,705,393
Leaving for legitimate drawback	24,660,874
Deduct cost of collection, 4 per cent. on M.74,059,963	2,962,398
Government Income	44,731,298
	<u>M.74,059,963</u>

Total make..... 420,684 tons.

Exports in raw sugar 140,778 ,,

279,906 tons.

Bounty, £0 12s. 2d. per ton of raw sugar.

1880-81.

CALCULATION SHOWING FALLING OFF IN REVENUE CAUSED BY BOUNTIES IN
EXCESS OF LEGITIMATE DRAWBACK.

1880-81. Duty and drawback based on proportion of 11·75 tons of beet required to make one ton sugar. Whereas, 6,323,778 tons of beet (Government figures) gave 594,223 tons sugar, (Licht's figures) = 10·64 tons of beet to one ton of sugar.

Duty on roots at 80 pf. per cwt. gave M.101,180,461

Exports in raw sugar value gave a total drawback of

M.55,867,355. As 11·75 : 10·64 : : 55,867,355 : bounty 5,277,355

Leaving for legitimate drawback 50,590,000

Cost of collection 4,047,218

Government Income 41,265,888

M.101,180,461

Total make 594,223 tons.

Exports in raw sugar 297,146 ,,

Home consumption 297,077 ,,

Bounty, £0 17s. 9d. per ton.

1882-83.

CALCULATION SHOWING FALLING OFF IN REVENUE CAUSED BY BOUNTIES
IN EXCESS OF LEGITIMATE DRAWBACK.

1882-3. Duty and drawback based on proportion of 11·75 tons of beet required to make 1 ton of sugar. Whereas, 8,747,771 tons of beet gave 848,124 tons of sugar = 10·32 tons beet to 1 ton sugar.

Duty on roots, at 80 pf. per cwt., gave M.139,954,459

Exports in raw sugar value gave a total drawback of

M.90,050,871, as 11·75 : 10·32 : : 90,050,871 : bounty .. 10,959,383

Leaving for legitimate drawback 79,091,488

Cost of collection 5,598,178

Government Income 44,305,410

M.139,954,459

Total make 848,124 tons.

Exports in raw sugar 478,994 ,,

369,130 tons.

Bounty, £1 2s. 10d. per ton raw sugar.

1883-84.

CALCULATION SHOWING THE FALLING OFF IN REVENUE CAUSED BY BOUNTIES
IN EXCESS OF LEGITIMATE DRAWBACK.

From *Die Deutsche Zucker Industrie*, edited by Mr. Herbertz, the expert referred to by Mr. Scott.

1883-84. Duty and drawback in August, 1883, based on the proportion of 11·75 tons of beet required to make one ton of sugar, and September, 1883, to the end of July, 1884, on the proportion of 11·25 beet to one sugar. Whereas, 8,896,771 tons beet gave 986,403 tons sugar (including molasses sugar) = 9·02 tons beet to one ton sugar.

Duty on roots at 80 pf. per cwt. gave	M.142,348,331
Exports in raw sugar value, gave a total drawback of	
M.109,339,784. As 11·25 : 9·02 :: 109,339,784, bounty	21,673,575
Leaving for legitimate drawback	87,666,209
Cost of collection	5,693,932
Government Income.....	27,314,615
	<u>M.142,348,331</u>

Total make..... 983,403 tons.

Exports in raw sugar 607,151 ,,

Consumption 376,252 tons.

Bounty, £1 11s. 3d. per ton raw sugar.

1884-85.

CALCULATION SHOWING THE FALLING OFF IN REVENUE CAUSED BY BOUNTIES
IN EXCESS OF LEGITIMATE DRAWBACK.

1884-5. Estimated from Licht's reports to May, 1885. Duty and drawback based on proportion of 11·25 tons beet to 1 sugar. Whereas, 10,471,074 tons beet gave 1,150,000 tons = 9·10 tons beet to 1 sugar.

Duty on roots, at 80 pf. per cwt., gave	M.167,537,184
Exports in raw sugar value gave a total drawback of	
M.138,600,000, as 11·25 : 9·10 :: 138,600,000, bounty..	26,493,334
Leaving for legitimate drawback	112,106,666
Cost of collection	6,701,487
Government Income	22,235,697
	<u>M.167,537,184</u>

Total production..... 1,150,000 tons.

Exports in raw sugar 770,000 ,,

Home Consumption .. 380,000 tons.

Bounty, £1 14s. 5d. per ton raw sugar.

HISTORY OF THE GERMAN SUGAR INDUSTRY FROM 1844 TO THE PRESENT TIME.

BEING A REPORT BY MR. SCOTT, SECRETARY OF THE BRITISH
EMBASSY, BERLIN, ON THE BOUNTIES ON RAW SUGAR
EXPORTED FROM GERMANY, DATED 20TH NOV., 1884.

Continued from July Number, page 369.

Prices in the German sugar market ruled by English market.

Owing chiefly to insufficiency of storage room in Germany, the German sugar industry has no influence on the prices of the German sugar market; these are entirely ruled by the English market, and, according to all the experts examined on this point, the price of sugar in Germany is at present, and will for some time continue to be, the price of the English market, plus the amount of the drawback obtained on the export of German raw sugar.

Magdeburg quotations give the price of raw sugar in March, 1884, of 96 per cent. polarisation, at 25·30 marks per centner; and the latest quotations of same sugar at 23·60 marks to 24 marks per centner.

Actual amount of bounties received less than generally reported; but difference in amounts of estimated and actual gain from roots accounts for falling off in revenue from the tax.

From the above remarks, it would appear that the amounts of the bounties which the exporters of German sugar have been recently receiving, contrary to the intention of the Legislature, are considerably less than they have been popularly supposed to be in England, but at the same time that the falling off in revenue from the excise on the roots is amply accounted for by the difference shown to exist between their actual sugar yield and that on which the present rates of excise and drawbacks were assessed in 1869.

Taking the average fixed by the committee of 10·75 centners: 1 centner of raw sugar of 93·75 polarisation, which can scarcely be termed an unfair one, the actual amount of the tax paid on each centner of this sugar consumed in Germany would have been 1·40 marks less than the legal tax of 10 marks, and the drawbacks received on its export, 1·40 marks more than the legal drawback of 9·40 marks, which, as shown above, contemplated a tax of 60 pfs. on each centner of raw sugar of this standard exported.

This would represent a loss to the Exchequer in—

1880–81 of 7,617,313 marks on home consumption of 5,440,224 centners;
and of 7,949,309 marks on an export of 6,288,206 centners.

Total loss. . 15,565,622 marks.

In 1881–82 of 7,988,736 marks on home consumption of 5,706,240 centners;
and of 8,803,488 marks on an export of 6,288,206 centners.

Total loss. . 16,792,224 marks.

In 1882-3 of 10,153,001 marks on home consumption of 7,252,144 centners;
and of 13,231,439 marks on an export of 9,451,028 centners.

Total loss.. 23,384,440 marks.

*The gain unequally distributed among manufacturers—Classification
of factories according to results.*

The proportions in which the corresponding gain has been distributed among the sugar manufacturers will be seen from the accompanying table, which was drawn up for the use of the committee, classing the sugar manufacturing districts, and the number of factories in them, according to the average quantity of roots which were officially returned as required to produce a centner of raw sugar of 93·75 polarisation. (See Table 3.)*

The maximum average ascertained is 13 centners and upwards. The minimum, 8·20 centners.

In 1880-81, out of a total number of 333 factories at work, 273 figure in classes representing averages varying from 10·60 centners to 12 centners, the largest number being in classes from 11·40 centners to 11·80 centners.

In 1881-82, 256 out of 343 factories appear in classes varying from 9·20 centners to 10·60 centners, the largest number of these being between 9·60 centners and 10·20 centners.

In 1882-83, 309 out of 358, in classes between 9·80 centners and 11·40 centners, the largest number of these being between 10 centners and 10·40 centners.

Only two factories have in any year obtained a centner of such sugar from less than 9·20 centners of roots, and the maximum quantity of roots which these two factories used in any year was 47,116 centners.

Proportion of factories obtaining maximum gain.

The maximum bounty of 1·40 marks could therefore have only been received in 1880-81 by 73 out of a total number of 333 factories, but in 1881-82 by 264 out of 343, and in 1882-83 by 256 out of 358.

As to the probable effect of bounties on increased production.

The next point which it is desired to ascertain is what effect these bounties have had on the increased production and export of German raw sugar. The committee discussed this point very carefully, and took the opinions of the experts on it.

Herr Fischer, the Wurtemberg expert on the committee, who argued very strongly in favour of an abandonment of the present mode of taxation for a tax on the manufactured article, was of opinion that the bounties had had a considerable influence in increasing the production; but none of his colleagues seem to have agreed with him, and but very few of the experts who were examined on this point.

* See page 427.

Committee's views on real causes of over-production.

The committee, and also the majority of the experts, attributed the recent enormous growth of production to the present condition of agriculture in Germany. The manufacture of sugar has now become to a great extent an agricultural interest.

Agricultural interests involved.

Owing to foreign competition, chiefly that of America, it was asserted that cereals are no longer a sufficiently remunerative crop, and the German farmer is forced to seek a more profitable one to supplement his diminished profit from the land. Beet is admitted to be one of the most profitable and certain in its results, and, at the same time, it is a crop which is considered to confer the greatest benefits on agriculture.

Improving effects of a beet crop.

It requires an unusually thorough treatment and preparation of the soil, which greatly enhances the value of any crop succeeding it. It was stated that the Silesian farmer, who used to prepare his ground to a depth of four to five inches below the surface for cereals, and six to eight for rape, has now to prepare it for a beet crop to a depth of from 12 to 14 inches, and accordingly to provide himself with better farming machinery and implements. One of the experts gave it as his opinion that the value of the cereal crops had already been doubled by the intenser cultivation demanded by the cultivation of beet roots. It was also the opinion of the committee that the best sugar roots exhausted the ground less than any other crop, as they absorbed less salts and nitrogen, and derived their saccharine particles from the nourishment which they received above the surface of the soil. In addition to these advantages the remnants from the raw sugar factories supplied the farmers with a valuable and inexpensive food for their cattle, and the residuum of the new processes by osmose, elution, and strontian could be advantageously used as a fertilising dressing for the fields.

Interest of the beet-growers in the sugar manufactories.

It was, therefore, not surprising to find the German agriculturist giving each year increasing attention to the cultivation of the best description of sugar roots, which with care and constant application could now be profitably grown in most of the climates and soils of Germany, and the more so as the financial success hitherto of the German raw sugar industry in which most of the beet growers were directly or indirectly interested as proprietors or shareholders of factories, or suppliers by fixed contracts of the raw material, had led them to expect increasing profits in the future.

It would seem as if the farmers, in the first years of the development of the sugar industry in Germany, had been inclined to regard the prospects of beet cultivation with considerable distrust, and had shrunk from the additional exertions and cost which it entailed, and that the sugar manufac-

turers had had some difficulty in inducing them to embark largely in the venture. Now the reverse seems to be the case; it is the beet-growers, backed, in many cases, by the machine manufacturers, who have benefited largely by the industry, who are at present stimulating and even forcing the sugar manufacturers to extend their business, and are occasioning the erection of new raw sugar factories, many of which are so-called farmers' factories (*bauern fabriken*), set up and working with borrowed capital, and machinery only partly paid for.

The roots which the farmer turns out, no matter how large the quantity, must be utilised, and the sugar produced over and above the amount of the home demand must be quickly exported, as there appears not to be sufficient storage in this country for the surplus production of even a few months.

This state of things will continue so long as the demand for raw sugar exists in foreign markets.

*Increased foreign demand further cause of increased production—
English demand.*

The increased foreign demand was also, in the opinion of the committee, one of the primary causes of the increase of German production. This was particularly noticeable in the case of the English demand, the consumption in England having risen from 39lbs. per head in 1867 to 63lbs. in 1882, the chief rise being quickly followed by a sudden increase of production in Germany. In support of this opinion it was shown to the committee that 68 per cent. of the total export of German raw sugar went to England in 1881, and 69·93 per cent. in 1882; that the Statistical Abstracts of the Board of Trade showed that in 1867 German beetroot sugar formed 16 per cent. of the total raw sugar imported by England, and 37 per cent. in 1881.

Several experts thought that the diminution of the Austrian export had also considerably stimulated the increase of the German exports.

Extent of agricultural interest.

Unfortunately, for the purpose of the present report, the German official statistics have ceased to give under a separate heading the actual annual area of the Empire under beet; some idea of the development of this branch of agriculture may, however, be gained from Table (No. 4)* annexed, showing the average yield per hectare during a series of years.

Objections to changing present mode of taxation of the roots.

Objections to tax on manufactured sugar.

The importance of the agricultural interests created by the sugar industry, and the benefits which the beet cultivation conferred on the soil, had great weight with the expert's committee in rejecting the proposal of the Wurttemberg member of the committee to abandon the present mode of taxation. Although many were prepared to admit that a tax on the

* See page 428.

manufactured sugar would be fairer to the manufacturers and more satisfactory in its results to the Imperial revenue, that it would enable the manufacturers to make their arrangements on a more certain calculation and that it might check over-production and steady the prices in the sugar market, only 13 of the 47 experts examined on this point were in favour of the change, and many of these accompanied their approval with reservations, and admitted the greatness of the difficulties and inconveniences which would for some time be occasioned by a change of system, which would require a costly and irksome control over the industry in general, and the introduction of more accurate appliances than at present existed to test and appraise the different standards of sugars produced and exported.

The committee were of the decided opinion that the removal of the tax from the roots would do away with the chief stimulus to the beet growers to produce a light root with the greatest possible proportion of saccharine contents by intense cultivation and application, and induce them to satisfy themselves with producing the maximum quantity of roots at the least cost and labour, and that the manufacturers would find it their interest to obtain an unlimited quantity of roots, irrespective of quality, at the cheapest possible rates.

The loss which would thereby be occasioned to the soil would, the committee considered, be immensely greater than any financial advantages which the Government might obtain from a larger and more certain revenue from the tax.

It was further argued that it would be very inadvisable to abandon a system under which the German sugar industry had so long flourished and attained to its present commanding position. If, as alleged, it worked unfairly in the case of individual manufacturers and districts, it could also be shown that in the very districts which complained most of this injustice the number of sugar factories was on the increase, and the area under beet was extending instead of diminishing.

Moreover, the tax recommended in place of the excise on the roots was one which had been tried in other countries and had not precluded the possibility of bounties, and some of these countries were now abandoning it and adopting the German system, which had proved more successful.

Objections to proposed tax on molasses.

Several other modes of assessing the tax were also discussed, among these a tax on molasses, or on the establishments exclusively engaged in extracting sugar from molasses, instead of direct from the roots, it being argued that, as there was no tax or duty in Germany on this article, and the sugar thus obtained received the same drawback as other sugars, these establishments were unfairly protected to the detriment of the rest, their number would undoubtedly increase, and so would over-production, and the amount of the

bounty which the industry was receiving contrary to the intention of the Legislature and the interests of the Imperial revenue.

To this it was replied that, according to the evidence of the experts, the new processes and establishments could not exist under the pressure of a tax on molasses high enough to have any appreciable influence on the trade in general; that with the increase of the demand for molasses the price of this article would rise, and that the raw sugar factories who were unable or unwilling to incur the cost of utilising their own molasses for the production of sugar would be equally benefited by disposing of them, as they did at present, at a profitable price to others.

The injustice in taxation might be equally removed by fixing the estimated sugar yield of the roots at a figure which would include the value of the molasses, and this the committee had already endeavoured to do. There was no evidence that any appreciable quantity of foreign molasses not obtained from roots already taxed in Germany was used by any of the molasses establishments.

Many of these, and especially the four existing strontian works, used an article of a much superior quality to that which had been defined as legitimate remnant molasses, viz., the syrup remaining after the first or second boiling in the direct process, which the raw sugar manufacturer had found it more profitable to sell at a comparatively high price, than to utilise it in his own factory as second or third products, and he had thus simply transferred a portion of his own raw material on which he had paid the legal excise to the strontian factory for an equivalent consideration.

Final recommendations of the Committee.

The recommendations in which the committee finally summed up their views of the evidence and information submitted to them were—

Sugar capacity of roots.

(1) To consider 10·75 centner roots as a fair average requirement for 1 centner of raw sugar of 93·75 polarisation, and to maintain the present system of taxation of the roots employed in the manufacture.

Rate of tax.

(2) To increase the amount of the tax from 80 pfs. per 1 centner of roots to 85 pfs.

Of drawbacks.

(3) To fix drawbacks on export of—

- (a) Raw sugars of at least 88 per cent. polarisation, or 8·53 marks.
- (b) Candies and hard white sugar, in loaves or crushed, at 10·57 marks.
- (c) Other hard sugars of at least 98 per cent. polarisation, at 9·90 marks.

Other recommendations.

(4) To organise a better system of taking statistical returns of the production and taxation of sugar, and to place the independent establish-

ments for extracting sugar from molasses and the sugar and syrup refineries under executive control.

(5) To retain the present duties on foreign sugars.

(6) Establishments for boiling the juice and roots to be exempted from the control.

(7) To allow the raw sugar manufacturers and refiners to warehouse their sugar free of tax, to the following extent:—Sugar admitted into bond to receive the legal drawback, and when taken out of bond for home consumption to be retaxed to the full amount of the drawback.

The period of credit at present allowed to the raw sugar manufacturer to be maintained at six months; but refiners taking sugar out of bond for refining purposes to be granted a credit of three months, provided always that proper precautions are taken to secure the interests of the Exchequer against any detriment in the meantime.

Bill proposed by Government last Session on Report of Committee.

Proposed rate of tax.

The Federal Council, in the draft of law which they submitted this year to the Imperial Parliament, appear to have adopted the general views embodied in the committee's resolutions, but they slightly altered the rates of the proposed excise and drawbacks in order to bring the tax as nearly as possible up to the original estimate of 10 marks on each centner of raw sugar of 93.75 polarisation. The tax on roots in this draft was accordingly raised to 90 pfs. per 1 centner (10.75×90) = 9.67 marks.

With regard to the drawbacks, the Government were of opinion that, as the quantity of sugar exported at present under 90 per cent. polarisation was so inconsiderable, this sugar should not in future be admitted to drawback. This arrangement, it was hoped, would tend to diminish the possibility of bounties. The Government accordingly proposed to fix the drawbacks on raw sugar of at least 90 per cent. polarisation at the rate corresponding with the tax actually paid by the quantity of roots required to produce it, viz., 9.30 marks (10.34×90), and the drawbacks on the two classes of refined sugar in the same proportion.

Of drawbacks.

The three drawbacks would thus be: (a) 9.30 marks.

(b) 11.40 „

(c) 10.70 „

This assessment, it was calculated, would bring up the net yield of revenue to nearly 60 millions of marks. The increase in the tax of 10 pfs. per centner of roots would appear to be justified by the ascertained increase in their sugar value.

The increase of the drawbacks would correspond with the proposed tax, and occasion a slight rise in the price of sugar in the German market which,

as shown to the committee, is the price of the English market, plus the drawback on German exported sugar.

The Draft Law deals with the measures for improving the system for collecting statistical information in the sense of the recommendations of the committee, but does not include the facilities recommended in the seventh resolution of the committee.

Bill unsuccessful in Reichstag, and will probably be abandoned.

Meantime circumstances have undergone a considerable change. The Government Bill failed to pass the last Parliament, and, judging from a passage in the Emperor's speech on opening the new Reichstag, the Imperial Chancery hesitates to submit it to the present Legislature.

Reasons for not proceeding with it—Depression in sugar trade—

Symptoms of crisis.

This hesitation is no doubt justified by the very serious crisis through which the sugar industry is now passing. The season of 1883-84 has again been a favourable one, and the production of raw sugar has increased in such dimensions that the supply at present far outstrips the normal demand of the export trade and of the German refiners and consumers. The number of raw sugar factories has increased instead of diminishing, and the area under beet extended. In Prussia alone the increased area in the last five years is stated to be 136,436 hectares.

Latest information for last season.

	Kilogrammes.
In 1883-84 the roots taxed were	8,896,770,700
Compared with 1882-83	8,747,153,700
Total export of raw sugar in 1883-84	494,581,868
Against, in 1882-83	394,229,124

Fall of sugar prices.

Meantime the prices of sugar, which began to fall in October, 1882, are sinking steadily month by month. The Magdeburg quotations of the average prices of raw sugar were :—

	Marks per centner.
In 1880	32-04
In 1881	32-08
In 1882	32-02
In 1883	29-95
In December last (1883)	27-37
And latest quotations*	24-00

Critical condition of manufacturers.

The present prices barely admit of any profit to manufacturers, many of whom are known to be working at a dead loss, in hopes of a rise, of which there is at present little prospect. The critical condition of a large number of factories, principally those working with borrowed capital, is notorious.

* The date of this report is November 20th, 1884.

Consequences feared from pressing proposed change at present.

The imposition of an additional excise of 10 pfs. on the centner of roots would have been a judicious and advantageous step to take three or four years ago, when the manufacturers were in a better position to bear a burden which, it is admitted, would fall exclusively on them, as the additional tax could not have sensibly affected either the export trade or prices in the sugar market. To do so in the face of the present crisis would be to run the risk of intensifying this crisis, and spreading ruin among a large class of raw sugar manufacturers.

Probable restriction of area under beet—Probable action of Government.

It is to be presumed that one consequence of the present crisis will be the necessary restriction of the area under beet cultivation in the ensuing season, thus supplying a slight check on over-production; in the meantime it is very probable that the Government will confine their action to encouraging and assisting the supply of more storage room in Germany for the raw sugar manufactured, and give other facilities to the German refiner, with a view to increasing the proportion which refined sugar now holds in the total export from Germany. A sensible increase in the home consumption is not expected for some time to come; indeed, the rise to 8 kilos. per head in 1882-83 is considered by many authorities to be too high a standard to represent the present actual consuming power of the country.

Concluding remarks—No prospect of any legislative change at present in tax—Sugar profit of roots likely to increase.

In conclusion, I would venture to point out that all the information which I have been able to collect on the subject of this report leads to the firm conviction that there is no immediate prospect of any important legislative change with regard to the taxation of sugar in this country which would have the effect of equalising the tax actually paid on the raw material and the drawbacks given on the export of the raw sugar manufactured, and thus do away with the possibility of illegal bounties; on the contrary, we may expect that as the improved processes of manufacture are developed and more generally applied the gain of sugar from the roots will increase, and the difference between the excise and drawback increase.

No desire to perpetuate a system of illegal bounties—Feeling against bounties in general.

At the same time it is, I firmly believe, the sincere desire of the Government and of the community at large to re-assess the excise and drawbacks as soon as ever this can be done without dangerously disturbing the interests and condition of the industry in general. The experts examined by the recent committee were almost unanimously of opinion that in ordinary times German raw sugar was quite capable of maintaining its position in foreign markets without the assistance of protection in any form, and that a system of bounties on export would only be injurious to the trade itself; that the object of the Government ought to be, when possible, to limit the drawbacks to the actual amount of the tax paid, to encourage the development of the home consumption, and to assist the refiner by every possible legitimate means to compete with profit in foreign markets.

Prospects of new "Separation" process.

If the new process to which I have referred in this report for obtaining an additional yield of sugar from the residuary syrup known as the "separation" process of elution realises the expectations of its inventor, it is quite possible that in the course of time the entire saccharine contents of the root will be crystallised in the direct process of extraction from the roots.

It would then be possible to readjust the tax and drawbacks in such a permanent manner as to exclude the possibility of a bounty, without fear of disturbing or injuring the trade, or the beet growers. Until then the Government must be content with a low revenue from the tax.

No chance of a tax on sugar instead of on roots, nor of manufacturing and refining in bond.

But under any circumstances the German Government will not be induced to alter their present mode of collecting the tax on the roots and to adopt the system of taxing the manufactured sugar, nor would they be disposed to incur the additional expense and odium of a system of control, such as compelling the trade to manufacture and refine their sugar in bond, two alternatives which I understand have been recommended by foreign interests, which consider themselves at present injured by the mode of taxation adopted in this country.

Over-production can only be checked by natural causes—(1) Shrinking of foreign demand, or (2) increase of home consumption.

The rapid over-production of raw sugar in this country can for the present only be checked by natural causes, such as a shrinking of the foreign demand, the restriction of the area under beet cultivation in Germany, or a rise in the demand for refining purposes or home consumption in Germany.

Herr Görz's opinion on these two points.

The opinion of many of the experts examined by the committee was that the foreign demand for raw sugar would continue to increase, and that it would be possible for German sugar to obtain a good footing in the American market. Herr Görz, in the work which I have already referred to, has summed up the information which he has been at pains to collect from all the countries interested in the sugar trade, in a table, fixing at 509,000 tons the present total over-production of sugar for the whole world, and warns the German manufacturers and beet growers that they must not reckon with too great assurance on an increasing foreign demand for raw sugar, but aim at increasing the home consumption, and the export of refined sugar of a description better suited than at present to the requirements of the southern markets.

This work, which is a private and quite unofficial publication, has commanded general attention in this country, as the valuable statistics, which Herr Görz has been careful to collect from the best available sources, have given the German sugar trade a clearer insight than it hitherto possessed into the actual condition and requirements of foreign markets, with the useful result, it is hoped, of dispelling many popular illusions and discouraging reckless investments and speculations in the future.

(Signed) CHARLES S. SCOTT.

Her Majesty's Embassy, Berlin, Nov. 20, 1884.

TABLE No. 1.—TAX AND DRAWBACKS ON SUGAR.

DRAWBACKS ON EXPORT.										
SEASONS.	Total Quantity of Roots Taxed.	Amount of Tax (=1/80 marks per 100 kilos.)	a. For Canded, &c., Sugar.		b. For other hard Sugars.		c. For Raw Sugar.		Total Amount of Drawbacks.	Balance Remaining of Tax (Col. 2, less Col. 9).
			Quantity on which drawback was allowed.	Amount of drawback (23 marks per 100 kilos.)	Quantity on which drawback was allowed.	Amount of drawback (21 or 20 marks per 100 kilos.)	Quantity on which drawback was allowed.	Amount of drawback (18 or 50 marks per 100 kilos.)		
1.	3.	4.	5.	6.	7.	8.	9.			
	100 kilos.	Marks.	100 kilos.	Marks.	100 kilos.	Marks.	100 kilos.	Marks.		Marks.
July 1, 1869-70	25,845,866	41,353,386	61,558	1,388,164	78,226	1,697,929	52,549	966,011	4,052,104	37,301,282
" 1, 1870-71	30,506,465	48,810,344	151,341	3,469,487	101,527	2,192,983	209,460	3,937,848	9,600,318	39,210,026
Sep. 1, 1871-72	22,509,182	36,014,691	41,763	960,549	16,328	352,685	56,665	1,065,302	2,378,536	33,636,155
" 1, 1872-73	31,815,508	50,904,813	51,331	1,180,613	28,472	614,995	81,777	1,537,408	3,333,016	47,571,797
" 1, 1873-74	35,287,639	56,460,222	41,120	945,760	26,310	568,296	118,092	2,220,130	3,734,186	52,726,036
" 1, 1874-75	27,567,451	44,107,922	39,452	907,396	15,359	331,754	28,338	542,154	1,781,304	42,326,618
" 1, 1875-76	41,612,842	66,580,547	47,125	1,083,875	25,329	547,106	458,942	8,628,110	10,259,091	56,321,456
" 1, 1876-77	35,500,366	56,800,586	73,935	1,700,505	43,423	937,937	462,189	8,689,153	11,327,595	45,472,991
" 1, 1877-78	40,909,680	65,455,488	140,013	3,220,299	83,416	1,801,786	712,010	13,385,788	18,407,373	47,047,615
" 1, 1878-79	46,287,477	74,059,983	193,561	4,451,903	113,966	2,461,666	1,034,718	19,452,698	26,366,267	47,693,696
" 1, 1879-80	48,052,615	76,884,184	252,364	5,804,372	97,052	2,096,323	951,616	17,890,381	25,791,076	51,093,108
Aug. 1, 1880-81	63,237,788	101,180,461	379,651	8,731,973	218,081	4,710,550	2,256,640	42,424,832	55,867,355	45,313,106
" 1, 1881-82	62,719,479	100,351,166	395,160	9,180,680	144,130	3,113,208	2,539,810	47,739,028	60,032,916	40,318,250
" 1, 1882-83	87,471,537	139,954,459	493,811	11,357,653	242,181	5,231,110	3,907,027	73,452,108	90,040,871	49,913,588
Average of last 3 years....	71,142,935	113,828,695	424,207	9,756,769	201,464	4,351,622	2,900,992	54,538,656	68,647,047	45,181,648
Average of last 14 years ..	42,810,152	68,496,243	170,968	3,929,470	88,217	1,906,084	919,265	17,280,617	23,116,171	45,380,072

For reference to this Table see July Number, page 371.

TABLE NO. 2.—TABLE SHOWING CONSUMPTION OF SUGAR IN GERMANY.

Years.	Production of Raw Sugar.	Importation of Sugar reduced to Raw Sugar.	Production and Import together.	Export of Sugar reduced to Raw Sugar.	Total Consumption.	Consumption per Head of Population.
	100 kilos.	100 kilos.	100 kilos.	100 kilos.	100 kilos.	Kilos.
1871-72	1,864,419	496,332	2,360,751	142,757	2,217,994	5.5
1872-73	2,625,511	270,852	2,896,363	179,382	2,716,981	6.6
1873-74	2,910,407	289,530	3,199,937	216,550	2,983,387	7.2
1874-75	2,564,124	276,910	2,841,034	108,134	2,732,900	6.5
1875-76	3,580,482	212,532	3,793,014	561,209	3,231,805	7.6
1876-77	2,894,227	125,060	3,019,287	603,538	2,415,749	5.6
1877-78	3,780,091	88,830	3,868,921	967,785	2,901,136	6.7
1878-79	4,261,551	79,710	4,341,261	1,380,768	2,960,493	6.7
1879-80	4,094,152	65,842	4,159,994	1,344,857	2,815,137	6.3
1880-81	5,559,151	56,073	5,615,224	2,839,039	2,776,185	6.8
1881-82	5,997,223	57,330	6,054,553	3,144,103	2,910,450	6.4
1882-83	8,351,646	66,012	8,417,658	4,725,514	3,692,144	8.1
Av'r'ge of 12 yrs.	4,040,249	173,751	4,214,000	1,351,137	2,862,863	6.7

TABLE NO. 3.—TABLE SHOWING REVENUE NETTED BY GOVERNMENT FROM TAXES AND DUTIES ON SUGAR.

AVERAGES.	From Tax on Roots, minus the Drawbacks.	Deduct Cost of Collection and Administration.	Amount of Tax netted by Government.	From Duties on Foreign Sugar and Syrup.	Total Receipts of Imperial Exchequer from Tax and Duties.	Amount of Tax per Head of Population.
	Marks.	Marks.	Marks.	Marks.	Marks.	Marks.
Five years, } 1869-1874	42,089,059	1,868,348	40,220,711	6,216,732	46,437,443	1.16
Five years, } 1874-1879	47,772,475	2,456,036	45,316,439	4,145,743	49,462,182	1.15
Four years, } 1879-1883	46,503,336	4,183,994	42,319,342	1,641,052	43,960,394	0.98
Three years } 1880-1883	44,973,411	4,553,527	40,419,874	1,610,668	42,030,542	0.93

For reference to No. 2 Table see *July Sugar Cane*, page 371, and to No. 3, page of present Number.

TABLE NO. 4.

SUGAR MANUFACTURING DISTRICTS AND FACTORIES ARRANGED IN CLASSES,
SHOWING AVERAGE AMOUNT OF ROOTS USED TO PRODUCE ONE CENTNER OF
RAW SUGAR OF 93.75 PER CENT. POLARISATION.

Centners.	1881.			1882.			1883.		
	Number of Chief Districts.	Number of Factories at Work in Districts.	Total quantity of Roots used.	Number of Chief Districts.	Number of Factories at Work in Districts.	Total quantity of Roots used.	Number of Chief Districts.	Number of Factories at Work in Districts.	Total quantity of Roots used.
			100 kilos.			100 kilos.			100 kilos.
13 & upwards..	5	10	1,732,066	1	2	178,315	1	4	462,142
12.80 to 13	1	1	142,090	4	9	1,242,270	—	—	—
12.60 „ 12.80	2	6	412,192	—	—	—	—	—	—
12.40 „ 12.60	2	2	248,262	2	3	509,172	—	—	—
12.20 „ 12.40	1	3	371,117	2	5	973,081	1	2	221,440
12.00 „ 12.20	3	10	2,347,352	3	19	3,182,345	1	1	166,386
11.80 „ 12.00	3	21	3,282,496	1	5	1,061,277	2	3	468,388
11.60 „ 11.80	6	85	15,870,173	2	13	2,591,353	1	2	340,868
11.40 „ 11.60	3	25	4,695,453	2	8	1,519,342	5	7	2,010,019
11.20 „ 11.40	3	47	2,157,410	—	—	—	3	27	6,478,295
11.00 „ 11.20	3	47	8,634,594	2	11	1,181,359	3	13	3,683,697
10.80 „ 11.00	4	38	9,312,141	3	4	760,238	4	43	10,034,922
10.60 „ 10.80	6	45	8,278,308	4	6	707,885	7	17	5,013,232
10.40 „ 10.60	2	9	1,673,569	6	48	8,063,945	12	107	24,697,950
10.20 „ 10.40	5	14	3,010,065	4	11	2,057,919	4	28	5,366,758
10.00 „ 10.20	1	4	846,024	5	54	10,095,805	7	43	14,024,660
9.80 „ 10.00	—	—	—	6	79	14,430,348	2	31	7,308,795
9.60 „ 9.80	—	—	—	3	39	9,589,775	1	1	663,920
9.40 „ 9.60	—	—	—	1	1	229,395	1	2	472,705
9.20 „ 9.40	1	1	208,718	2	24	3,933,589	2	25	5,533,520
9.00 „ 9.20	—	—	—	—	—	—	—	—	—
8.80 „ 9.00	—	—	—	—	—	—	—	—	—
8.60 „ 8.80	—	—	—	1	1	198,350	—	—	—
8.40 „ 8.60	—	—	—	1	1	213,715	1	1	235,580
8.20 „ 8.40	—	—	—	—	—	—	—	—	—
8.00 „ 8.20	—	—	—	—	—	—	1	1	228,260

For reference to this Table see page 419.

TABLE NO. 5.—AVERAGE ANNUAL YIELD OF ROOTS PER HECTARE* THROUGHOUT GERMANY, 1871—1882.

YIELD OF ROOTS PER HECTARE ON AREAS CULTIVATED BY SUGAR MANUFACTURERS.

	1871.	1872.	1873.	1874.	1875.	1876.	1877.	1878.	1879.	1880.	1881.	1882.	Min. Yield.	Max. Yield.	Average since	
															1869.	1877.
In	100 kilos.	100 kilos.	100 kilos.	100 kilos.	100 kilos.	100 kilos.	100 kilos.	100 kilos.	100 kilos.	100 kilos.	100 kilos.	100 kilos.	100 kilos.	100 kilos.	100 kilos.	100 kilos.
Prussia	202	254	272	203	295	253	274	291	253	328	286	345	202	345	271	296
Baden	224	227	213	243	238	229	269	315	303	327	224	342	213	342	263	297
Wurttemberg	224	245	210	280	268	204	238	315	238	287	271	349	204	349	261	283
Bavaria	194	192	187	183	216	180	220	231	220	245	204	280	180	280	213	233
Schwarzberg.	129	202	254	177	254	195	198	268	225	230	213	309	129	309	246	240
Anhalt	209	248	277	166	256	264	285	288	223	335	269	345	166	345	264	291
Brunswick . .	280	284	294	276	358	260	277	302	287	346	287	356	208	358	295	309
Mecklenberg.	—	188	239	189	179	151	198	231	263	273	259	374	151	374	231	266
Thuringia . .	186	197	245	176	221	199	234	197	193	208	249	246	176	249	212	221
German Cus- toms Union..	204	254	272	206	263	252	274	289	252	327	283	344	204	344	271	295

* A Hectare is equal to 2·4711 English acres, 100 Kilos. = 2 cwt.—It is exactly 230·485 lbs. For practical purposes divide the figures here given by ten to reduce to tons.

SOMETHING ABOUT THE ARRANGEMENTS BETWEEN
THE BEETGROWER AND FABRICANT IN GERMANY,
FOR THE CAMPAIGN, 1885-86.

COMMUNICATED.

Referring to the figures given to cane planters by Mr. Russell, of Demerara, in his pamphlet reprinted in the *Sugar Cane* for April last, "*Reflections on the relative positions of Beet Sugar and Cane Sugar, as produced respectively for refining purposes in Germany and Demerara,*" it may not be uninteresting to your readers to learn what the Fabricants in Germany are doing for the 1885-86 crop. As an example I give some particulars of a factory—not a large one—which works up from 1,500 to 2,000 tons of beet sugar for refineries during the season.

The works in question belong to the Peiner Sugar Manufacturing Company, which is under the management of the Technical Inspector, Mr. E. Riecke.

The Peiner Sugar Company have their works in the district of Fildesheim, where the large molasses refinery is making white sugar from molasses only. It is one of the oldest in that locality and has worked nearly 20 years, showing dividends from 20 to 30 per cent.

Nearly all the roots worked are grown by the Company and on a soil not at all favourable for beet culture. The factory has paid until now from 20s. to 25s. per ton of roots, which contain on the average 11·5 per cent. of sugar. We learn from reliable sources that the Company have entered into agreements with the beet growers for the next crop to pay 70 pfs. per cwt., that is 14s. per ton of beet roots, real sugar beets, healthy, without dirt, the head or tops cut off, and not green-coloured roots, containing, according to the analysis of the chemist, not less than 11 per cent of sugar; the roots to be delivered at the works, and for every 100 tons of beet roots, the farmer, or contractor has returned to him up to 38 tons of slices from the diffusion battery.

This well-pressed extracted beet is considered excellent food for the cattle, and, if well prepared, invaluable to the farmer. If, however, the farmer prefers a return in cash, which is not often, he is to receive 4s. per ton. The farmer is provided with the seed by the company, and none other is permitted to be used.

If 88% beet sugar realizes more than 24s. per cwt., including internal tax, then the Company is to give the farmer 16s. per ton for his roots, in the place of 14s.

These are the general terms at the present time in Germany for 1885-86. The Peiner Sugar Company is one of those that agreed to give last campaign (1884-85) the full prices before mentioned, namely, 20s. to 25s. per ton, and have settled, without hesitation, with the farmers on this basis.

ARGENTINE SUGAR INDUSTRY.

SUGAR FACTORIES IN TUCUMAN.

The following list of the principal sugar factories is taken from the *Industrial Argentina*.

District.	Owners.	Yearly Capacity. Tons.	Makers of Machinery.
Los Ralos	Avellaneda & Co.	460	Fawcett, Preston, & Co.
Medians	Mendez & Heller	1,590	" "
Concepcion	Juan C. Mendez	1,500	" "
La Concepcion..	D. Methven & Sons	700	" "
Ranchillos	Belastguy & Co.	100	Cail & Co., Paris.
Medinas	Felipe Bernan	200	" "
Cruz Alta	Vicente Garcia	1,000	" "
Banda	Domingo Garcia	1,150	" "
Cebil Redondo..	Justiniano Frias	400	" "
Colemar	Mata, Astal, & Dubourg.	1,500	" "
Reducion	Emilio Posse	400	" "
Aguirres	Felipe Posse e hijos	1,000	" "
Banda	Manuel Posse	1,200	" "
Esperanza	Wenceslao Posse	2,000	" "
Carpinchango..	Juan Recault	500	" "
Tucuman	"Perseverancia" Co. ..	500	" "
Munantial	Videla and Gurnaud....	250	" "
Monteras	Costanti, Gerardo, & Co.	500	" "
Lastenia	Maximo Etchecopar	1,200	Compagnie Fives-Lille.
Cruz Alta	Fidel Garcia	1,000	" "
Bella Vista	{ Fernandez, Garcia, } e hijos. }	1,000	" "
Cruz Alta	Gallo Hermanos	600	" "
Graneros	Turreria & Duberts	200	" "
Lules	Clodinio Hibret	1,150	" "
Amulia	Ezequiel Molina	100	" "
San Pablo	Nougues Hermanos	500	" "
Lules	Padillo	460	" "
San Juan	Paz and Posse	400	" "
Las Garcias ..	Olivera and Co.	350	" "
Cerro	Cordova del Tucuman ..	1,200	" "
Famailla	Deposte & Co.	500	Hickmann & Paulmann.
Tucuman	Tabaoda & Dode	250	Mariolle Bros.

32 FACTORIES.

Tonnage	22,470
English	3,900
German	500
French	18,070
	<u>22,470</u>

* Also Cail & Co.

† Also Cail & Co.

‡ Still by Ross, of Rosario.

CENTRAL SUGAR FACTORIES AT BRAZIL.

The report of the directors of the Central Sugar Factories of Brazil, Limited, presented to the meeting on July 8th, states that the four factories of Cabo, Escada, Cyambuca, and Bongosta, are now completed, and the experience gained from the first season's working proves that the machinery is efficient, and more than equal to the requirements. The tramways are now put in substantial condition, and the rolling stock, both as to locomotives and cane trucks, is sufficient and suitable for the company's purposes. All arrears of guaranteed interest to 31st December last have been received from the Brazilian Government. By the issue of the Second Debentures for £70,000 (of which £62,600 have been subscribed, leaving a balance of £7,400 unissued), the liabilities of the company have been cleared off, and there is now in hand sufficient to meet all current expenditure, and to provide a margin for working capital. "The working of the past season shows very unsatisfactory results, due mainly to the short supply of cane, which caused frequent and long stoppages, a full day's work being a rare exception at either of the factories. It has, however, been clearly shown by experience at the different factories of the actual working on particular occasions, that with a full supply of cane the machinery was not only capable of manufacturing 20 tons of sugar per diem, but could do considerably more. All canes offered by contracting planters were ground, and a further quantity from outside sources at moderate rates could have been obtained, but the company were unable to take advantage of these offers until the whole of the contract canes were finished, after which the supply offered was insufficient to keep the mills profitably at work. The further outlay necessary is estimated at £10,000, a large portion of which will be expended on extensions of the company's tramways, to connect with the estates of planters willing to contract for the supply of cane, but which cannot be served by the Recife and San Francisco Railway, which will be made use of as far as possible to carry canes to the different markets."

THE INVENTIONS EXHIBITIONS, 1885.

We are glad to bring under the notice of our readers the two Exhibits, in Groups 14 and 17, of Messrs. E. Packard & Co., Ipswich, which have a special interest for sugar planters and manufacturers:—

Group 17. ED. PACKARD & Co., Ipswich.

Exhibit.

1. A number of samples of sugar, manufactured in the Mauritius under the new process invented by Messrs. Icery, Bernard & Ehrmann, and patented by them in the Mauritius and elsewhere. By this process a great economy is effected in the manufacture of cane sugar, and the following are the advantages that this process offers:—

1. Increased yield of sugar.
 2. Improved quality of sugar.
 3. Proportion of molasses reduced.
 4. Great economy effected.
 5. Necessity for charcoal filters obviated.
 6. Superior clarification obtained.
 7. More lime may be employed in defecation.
 8. The evils of overtempering are counteracted.
 9. The cost of the reagents is recovered in its value for manuring next crop.
 10. Greater proportion of first-quality sugar produced.
2. Various reagents used in the above process, including a particular form of phosphoric acid, to which the name of "Ehrmannite" has been given, and which is entirely soluble in water, and is manufactured by the Exhibitors under patents invented by them.

Group 14. ED. PACKARD & Co., Ipswich.

Exhibit.

Phosphoric acid.

Concentrated superphosphate of very high quality.

Phosphates of soda, potash, and ammonia, and other compounds manufactured under processes protected by Letters Patent, dated May 31st, 1878, numbered 2,182, which comprises the use of a particular form of mixing apparatus for dissolving phosphates; the mode of separating the gypsum and the solid mass from the liquid phosphoric acid by means of filtering presses, particularly wooden filtering presses; the mode of concentrating the phosphoric acid

solution so obtained; and several other processes connected with the manufacture of superphosphate, &c. Also, Patents dated 9th April, 1884, No. 6176, and the 24th April, Nos. 6,750, 6,751, and 6,752. The chief point of novelty is the practical and cheap method of manufacturing phosphoric acid, from which can be produced superphosphate and other compounds of high concentration, and, if necessary, of great purity.

EXPORTS OF REFINED SUGAR FROM CALCUTTA, 1884-85.

The following particulars are taken from the Calcutta Custom House Returns of the Bengal Presidency, for the official year 1884-1885:—

The exports of refined sugar have fallen away to a very low point, the decline, in comparison with 1883-84, being 92 per cent.

Only the United Kingdom took any considerable quantity of sugar from us last year, the shipments to other countries being insignificant, and even to the United Kingdom the exports are only a fraction of what they were in 1883-84. The cause of this falling off is due to the low price of sugar in Europe; due to the enormous production of beet on the Continent; this made it impossible to send supplies from here at prices low enough to compete. * * * *

The exports to England were all during the first three months of the year; during the remaining nine they ceased altogether.

Bengal has been a sugar-exporting, as well as a sugar-importing, country, but in the past year it has almost ceased to export, and has become an importing country instead.

The low prices ruling in Europe have caused large importations principally from the United Kingdom and Austria, almost entirely of beet sugar. Supplies have been also sent from Java. The total imports being in excess of the exports. The following figures show the quantities imported from the above three countries for the past two years:—

	1883-84.			1884-85.	
	Cwts.	Rs.		Cwts.	Rs.
United Kingdom ..	99	1779	....	22,166	247,385
Austria	1	20	...	13,542	169,928
Java .....	—	—	....	20,043	162,963
	100	1799		55,751	580,276

EXPORTS OF REFINED SUGAR FROM CALCUTTA.

	1880-1.		1881-2.		1882-3.		1883-4.		1884-5.	
	Cwts.	Rs.*	Cwts.	Rs.	Cwts.	Rs.	Cwts.	Rs.	Cwts.	Rs.
To United Kingdom...	696	9,313	10,430	123,409	78,724	827,176	153,704	1,673,101	10,855	109,495
France	84	1,125	..	..	1,299	17,895	..	..	9	100
Italy .....	..	..	4	50	..	..	475	4,900	..	..
Ceylon	6,393	114,233	2,902	50,217	1,487	21,279	1,948	28,815	458	7,034
Other Countries	2,287	38,529	2,797	43,868	4,429	63,741	3,869	53,562	1,530	20,592
Total	9,460	163,200	16,133	217,544	85,939	930,091	159,996	1,760,378	12,852	137,221

* The value of the Rupee used in these Tables is Two Shillings.

THE COLONIAL BANK.

The shareholders of the Colonial Bank held their half-yearly general meeting on July 2nd, at 13, Bishopsgate Street. Mr. H. H. DOBREE presided, and in moving the adoption of the report, which recommended a dividend of 5 per cent. for the half year, said that nobody, not closely connected with the West Indies, could have any idea of the severity of the crisis which had prevailed there during the last twelve months. In some of the islands distress caused by the very low price of sugar had been greatly aggravated by a long-continued and severe drought in some of the smaller islands. The labourers had been almost on the verge of starvation, and planters and merchants had also severely felt the strain; but, fortunately, the rise in price which set in, in the early part of this year, had relieved the pressure. The rise amounted to something like 60 per cent. from the lowest price reached. All they wanted now to bring about increased prosperity in the West Indies was fair treatment. For many years now the West Indies had suffered from the bounty-fed beetroot-sugar which had been brought into this country, and he thought they had reason to hope, from what had been said by various members of the new Ministry, that they would do justice to the West Indies, and that they would not only enable the colonies to make reasonable and advantageous treaties with the United States and Canada, which was refused absolutely by the last administration, but that they might be prevailed upon to put on some countervailing duty. There was a good deal of nonsense talked about a countervailing duty, which, it was said, would raise the price to the consumer; but it had been computed that an amply sufficient countervailing duty would only amount to one halfpenny per pound. He thought it was a matter of congratulation, seeing the times they had passed through, that they had been able to pay a dividend equal to 10 per cent. for the year, and carry something to the reserve fund.

In answer to a question, the Chairman stated that he did not wish to tell all he knew; but he might say that the new Colonial Secretary had sent for the Chairman of the West India Committee, so that they might expect that the Government were already considering the subject they had so often discussed.

The latest quotations for £100 Colonial Shares, £30 paid, is £44 to £46; the highest and lowest for the past four years were as under:—

	1881.	1882.	1883.	1884.
Highest	£67 ..	£69 ..	£76 ..	£77
Lowest	57 ..	62 ..	64 ..	38

ROYAL AGRICULTURAL SOCIETY'S SHOW AT PRESTON.

The Show this year at Preston is generally admitted by those who have visited it and reported upon it, as having been a very good one. Our space only permits us to select a very few of the exhibits in the Agricultural Implements' Section.

JOHN FOWLER & Co., as usual, have a large display. No show would be considered complete without one or more of their world renowned steam ploughs. One of the chief novelties this year is their new road locomotive, arranged to drive all four wheels instead of two. The advantages claimed for this alteration are, that the grip on the roads is increased, and that the engine can draw more weight with a given amount of steam, and the wear and tear of roads is spread over a larger surface, and consequently is less in any one place. Another novelty is an implement (Hitchcock's Patent) for clearing land, which performs the operation of rolling, cultivating, and harrowing afterwards, at one time—a valuable combination—without being more cumbersome to deal with when turning at the headlands, as it takes little or no more room than an ordinary cultivator.

RUSTON, PROCTOR & Co. have also a fine display, principally of engines; their compound semi-fixed engine we noticed last year, in giving some account of their exhibit at the Amsterdam Exposition of 1883. They show this year a finishing thrashing machine, of new design, with "patent gear," driven by a single shaft, without cranks or inside bearings, mounted on strong wood wheels. They have also an improved centrifugal pump, and a saw bench, with 36in. saw, superior fence, boring table, &c.

W. H. BAILEY & Co. exhibit two hot air engines, vertical and horizontal; a notice of which appeared in the *Sugar Cane* for September, 1884, page 471. They also show a manual pumping engine for farm and estate work.

F. W. REYNOLDS & Co., Blackfriars, London, S.E., have a 50-ton patent portable wooden silo, fitted with their patent mechanical chain pressure, (16 tons) with covering boards and pressure beams complete, price, with roof, £50. It says something for the progress which ensilage has made, when it is stated that there were only six silos in this country some three or four years ago, whilst last year the

number exceeded one thousand, and we were informed that the number existing at the present time cannot be less than two thousand. Two silos, same as the one here exhibited, have recently been sent out to Barbados, for cane tops. We shall be interested in learning the result of this experiment.

The show was well attended; the numbers for the five days exceeding 94,000, and altogether it will be remembered as one of the most pleasant meetings of the Royal Society for many years.

SUGAR REFINING BY ELECTRICITY.*

5, Baltic Buildings, Redcross street,
Liverpool, 17th July 1885.

THE ELECTRIC SUGAR REFINING CO. OF NEW YORK.

Cable advices to myself and others in Liverpool have just been received from several gentlemen who were present at the demonstration of this Company's process of refining sugar, which was given on the 15th instant, in New York, on a scale much larger than has heretofore been attempted. *The result was most satisfactory, for in the short space of seven hours some forty barrels of refined sugar were produced from a common grade of ordinary West Indian refining sugars, without making any syrup or soft sugars; the whole product being the highest grade of refined sugars, the analysis of which exceeds 99.50 per cent. cane sugar.*

The conditions upon which this demonstration was to be given (as per my letter advices received previously), were to be as follows:—

1. Five to six tons raw sugar were to be refined at one time; the same to be carefully weighed and analysed; the analysis to be by Professor Chandler, of Columbia College, New York, who is a well-known public analyst.

2. The premises in which the machine stood to be thoroughly examined by the gentlemen present, to see that no sugar was there except the raw which had been brought to be refined. Every precaution to be taken to see that no communication from without was possible.

3. This done, they should certify the same in writing, and then the work of refining would commence and continue, they being in and around the premises during the time occupied.

* We have referred to these letters in our article, page 395.

4. The inventor undertakes, as a condition of the demonstration, to return them refined sugar of such sizes as they may designate before the demonstration, and to give them in weight of refined sugar within one per cent. of the weight of the entire saccharine matter in the raw sugar, including glucose or invert, as shewn per the analysis of Prof. Chandler, and he also undertakes that the said refined sugar will analyse not less than 99.50 per cent. cane sugar.

5. These things being performed, the demonstration was to be considered conclusive and satisfactory in every particular.

The reason for giving this demonstration, which is one of many, is to secure from the sale of shares the balance of the capital required to complete the machinery and put it into operation, and I am advised that sufficient have been contracted for, pending this demonstration, to furnish that, including a small number of shares which have been placed in my hands for that purpose. I am also advised that the machinery to refine 500 tons of sugar per day of 24 hours is far advanced in its construction, and will now be pushed forward to completion.

I shall be happy to give any further information required, and to show samples of the sugar which is produced by this process.

JAMES U. ROBERTSON.

5, Baltic Buildings, Redcross Street,
Liverpool, 28th July, 1885.

THE ELECTRIC SUGAR REFINING CO. OF NEW YORK.

With this I beg to hand you copy of the Report made by the gentlemen who attended the large demonstration of this Company's process of refining sugar, which was made in New York on the 14th inst., and reported to me by cable on the 15th inst., as I have already advised.

I am personally acquainted with four of the five whose signatures are appended to the original document which I hold, and one of them, Mr. A. D. Snow, has been my trusted friend for many years. In a private note to me he says: "I have no reason to doubt that he (the inventor) did what he said he did."

This last demonstration is one of many links in a chain of evidence which I have received, that renders any other conclusion impossible

than that we have in this invention a most valuable property, and one which will yield large profits to the shareholders in The Electric Sugar Refining Company.

I am expecting further reports by a subsequent mail, but, as the present one is important, I hasten to place a copy of it in your hands.

JAMES U. ROBERTSON.

REPORT

Of the Demonstration given by the Inventor, on 14th July, 1885.

We, Lawson N. Fuller, of the city of New York, merchant; Alfred D. Snow, of the same place, of the firm of Snow and Burgess, ship brokers; Frederick Felton, of the city of Boston, merchant; Robert N. Woodworth, president, and W. H. Cotterill, vice-president of the Electric Sugar Refining Company, of the said city, hereby certify as follows:—

That, on the 14th of July, 1885, we attended at the house of Professor H. C. Friend, in the city of New York, for the purpose of witnessing a demonstration of his process of refining sugar. That we arrived at his house at about six o'clock in the morning, and were admitted into the basement. In the inner passage we found packed in a pile a large number of bags of raw sugar numbering eighty-four, and which I, the said Fuller, from an examination of some of the said eighty-four bags, certify were part of a parcel of one hundred and twenty bags which I had on the previous day examined with Mr. W. R. Leviness at the warehouse where they were stored.

We were shown into the dining-room in the front of the basement, and were there introduced to Professor Friend and his wife, and also to the latter's stepfather, Mr. Howard, and another young man who, we understood, was a relative; the two latter being there to put the raw sugar into the hopper and turn the crank, which was the motive power by which the machinery was run.

Before going to said demonstration we were informed that whilst Professor Friend wished to afford every facility to make such examination of the premises as was necessary, it must be distinctly understood that we were not in any way to touch or interfere with the refining apparatus.

The house is one of a row of the usual brownstone-front houses, in a street between two of the main avenues of the city, the houses being separated by brick party walls. We first examined the basement

which consisted of the following rooms. In the front is the dining-room, which had been cleared out for the purpose of the demonstration. The room is about twelve feet wide and eighteen feet long. In this room were placed four empty barrels, lined with blue paper. At the back end of this room was part of the refining apparatus, consisting of a hopper and manipulator, in which the raw sugar was to be placed. From the hopper and manipulator was a funnel, which went through an aperture in the floor into the machine in the cellar below, and through which funnel the sugar passed into the machine.

This part of the machine was almost entirely exposed to view. From the dining room we went into the kitchen. Beyond the kitchen is a glass extension the whole width of the house, opening into an open yard, about twenty feet square, enclosed all round with a high wooden fence without any opening, separating the house from the adjoining houses in the rear and on each side, and which yard is completely overlooked by the adjoining houses. We then went down into the cellar, which runs the whole depth and width of the house, from front to rear and from party wall to party wall, and being immediately under the dining room and kitchen. In the cellar we were shown the apparatus for refining sugar. It was all enclosed in wooden casing except an opening at the side from which the refined sugar was to run and the running gear. The entire length was about twelve feet, and the width, which was irregular, averaged about three feet. The first two sections were about one and a half feet deep, supported by iron stanchions about two feet from the ground, the last section was about three feet deep, coming to within about six inches of the ground, so as we could see completely thereunder. One end, or what may be termed the head of the apparatus, stood immediately under the aperture in the ceiling above mentioned, and through which the funnel above mentioned passed, and entering the apparatus conveyed the raw sugar thereto. We were informed that the refined sugar, after coming out of the machine, had to be taken or carried up stairs to the dining room, there to be put into the empty barrels, and for which purpose three large galvanized iron pails, lined with sheet copper, had been provided. The cellar was otherwise entirely clear, except some loose boards. We made a careful examination of the entire cellar and basement, and are thoroughly satisfied that there was no sugar on the aforesaid premises other than the aforesaid eighty-four bags of raw sugar. It was then arranged that Professor

Friend should give us such an assortment of the different sizes of refined sugar which his apparatus made as would give the best idea of the capabilities of his process. We were then informed by Professor Friend that owing to the severe labour attending the handling of such a large parcel of raw and refined sugar in such small rooms, and especially conveying the sugar from the cellar to the floor above, the process would occupy several hours, and it was arranged that we should return later in the day to see the results of the process, and that we should be notified the time to return as soon as the process was finished. We left the house about seven o'clock. Mr. Cotterill called at the house during the afternoon, and at five o'clock was informed that the process was about through, but as they had to clear up and put things in order, it was arranged that all parties should be at the house at half-past seven to see the refined sugar. As this hour was too late for Messrs. Fuller and Snow to remain in the city, it was arranged that Messrs. Felton, Woodworth, and Cotterill should go there at that hour, and that all parties should meet there the following morning at half-past nine.

We, the said Felton, Woodworth, and Cotterill, accordingly went to the house at half-past seven, and there saw the aforesaid 40 barrels filled with refined sugar of 12 different sizes, from the finest granulated up to about the size of small bird's egg, and that all the aforesaid 84 bags except four had been refined. We were informed by Professor Friend that it took till half-past eight in the morning to strip the casing off the apparatus and get ready to commence the running. That the work was continued to one o'clock when he left off till three to rest and take refreshments. That work was resumed at three, and that the whole process was through at half-past five, and that the actual time occupied in refining the sugar did not exceed in the whole seven hours.

We have no reason whatever to doubt that the aforesaid refined sugar was produced by the said Friend, by his said process, on the said 14th July, from the aforesaid raw sugar.

Dated, New York, this 15th day of July, 1885.

(Signed) LAWSON N. FULLER.
ALFRED D. SNOW.
FRED L. FELTON.
R. N. WOODWORTH.
W. H. COTTERILL.

TOTAL EXPORTS OF SUGAR AND MOLASSES FROM CUBA FOR TEN YEARS, 1875-1884.

Years.	DESTINATION.						TOTAL.	
	SUGAR IN BOXES.						Boxes.	In Tons.
	United States.	Great Britain.	North Europe.	France.	South Europe.	Other Parts.		
1884.....	152,326	12,147	107	251	106,084	5,809	277,614	52,746
1883.....	103,273	1,113	2,000	3	67,253	112	164,086	31,097
1882.....	93,604	12,612	8	2	85,897	2,277	198,092	37,041
1881.....	94,008	10,030	8	91	78,805	1,570	184,512	33,057
1880.....	115,202	35,804	2,803	4,303	79,472	3,621	241,295	45,846
1879.....	135,317	108,016	4,575	9,613	122,021	13,893	383,465	72,858
1878.....	212,020	52,760	2,089	1,793	94,738	71,380	475,735	92,313
1877.....	262,832	71,200	5,264	1,814	92,589	12,159	438,858	82,313
1876.....	450,942	133,195	12,987	162,911	165,962	5,550	786,852	149,502
1875.....	426,000	466,792	22,008	61,389	165,962	5,550	1,147,701	218,063
Average	204,656	90,360	5,520	9,224	104,661	4,794	419,216	79,850
Years.	SUGAR IN HOGSHEADS.						Hhds.	In Tons.
	United States.	Great Britain.	North Europe.	France.	South Europe.	Other Parts.		
	United States.	Great Britain.	North Europe.	France.	South Europe.	Other Parts.		
1884.....	660,656	5,492	407	.....	1,819	12,315	680,689	420,326
1883.....	568,552	4,167	.....	.....	2,445	5,356	610,500	376,983
1882.....	488,577	12,877	.....	383	1,455	8,393	610,995	500,789
1881.....	488,051	1,837	.....	408	10,610	12,041	670,461	414,010
1880.....	951,154	28,097	1,400	4,953	3,272	11,518	728,724	449,987
1879.....	738,811	133,248	1,400	6,367	3,245	3,401	892,432	551,077
1878.....	631,656	14,685	.....	608	2,367	3,723	652,695	403,039
1877.....	597,671	9,931	1,322	.....	2,614	3,723	612,141	377,997
1876.....	568,785	56,882	.....	1,344	708	1,020	626,769	368,248
1875.....	628,793	76,840	305	6,918	1,801	2,744	717,401	442,561
Average	652,193	26,660	343	1,970	-3,174	6,106	700,477	432,544
Years.	MOLASSES IN HOGSHEADS.						Hhds.	In Tons.
	United States.	Great Britain.	North Europe.	France.	South Europe.	Other Parts.		
	United States.	Great Britain.	North Europe.	France.	South Europe.	Other Parts.		
1884.....	176,515	.....	.....	.....	198	1,058	177,771	115,552
1883.....	149,883	.....	.....	.....	218	4,195	154,296	100,292
1882.....	192,891	.....	.....	.....	368	8,624	201,883	131,324
1881.....	142,776	40	.....	.....	113	5,912	149,841	96,747
1880.....	172,581	.....	.....	.....	171	2,977	175,729	114,223
1879.....	192,818	31,658	91	.....	543	.....	225,140	146,341
1878.....	145,039	6,185	.....	.....	993	637	152,854	99,355
1877.....	182,365	7,273	.....	.....	89	.....	159,727	103,822
1876.....	263,727	1,083	.....	.....	108	.....	211,532	137,495
1875.....	263,211	5,433	.....	.....	87	15,633	284,374	184,843
Average	179,182	5,170	9	.....	289	4,562	189,214	122,974

IMPORTS (UNITED KINGDOM) OF RAW AND REFINED SUGARS.

JANUARY 1ST TO JUNE 30TH, 1884 AND 1885.

Board of Trade Returns.

RAW SUGARS.	QUANTITIES.		VALUE.	
	1884.	1885.	1884.	1885.
	Cwts.	Cwts.	£	£
Germany	3,346,789	4,720,656	2,791,368	2,806,044
Holland.....	82,045	115,217	70,971	75,287
Belgium	316,841	211,105	278,781	139,144
France	31,883	22,212	32,616	17,691
British West Indies & Guiana	1,652,609	1,366,899	1,720,640	1,090,880
British East Indies	573,164	231,928	365,466	108,611
China and Hong Kong	98,277	14,679	67,976	5,644
Mauritius	160,655	104,151	126,722	67,507
Spanish West India Islands	141,526	360,238	119,707	257,607
Brazil	955,406	878,167	773,963	517,210
Java	2,206,780	2,535,338	2,149,528	1,915,178
Philippine Islands	492,392	124,454	336,638	58,676
Peru	241,198	260,391	221,091	172,565
Other Countries	278,794	350,248	160,474	239,331
Total of Raw Sugars ..	10,578,359	11,301,683	9,315,941	7,471,678
Molasses	243,780	203,006	89,201	69,695
REFINED SUGARS.				
Germany	344,608	531,777	383,480	444,085
Holland.....	642,852	694,515	734,658	612,853
Belgium	49,076	44,737	59,202	44,237
France	675,011	351,028	802,185	325,131
United States	451,039	1,462,919	483,504	1,297,001
Other Countries	22,215	1,938	25,276	1,522
Total of Refined	2,184,801	3,086,914	2,488,305	2,724,829

IMPORTS OF FOREIGN REFINED SUGAR.

The British Sugar Refiners' Committee furnish us with the following figures, giving the imports of foreign refined sugar for the month of June compared with the corresponding month of last year, and the average monthly imports for the year compared with those of 1883 and 1884, distinguishing the quantities of "Lumps and Leaves" from "other sorts," and giving the separate imports from each country:—

	"LUMPS AND LOAVES."						"OTHER SORTS," Including Crushed Loaf, Granulated, Crystallized, &c.						TOTAL.					
	Monthly Average.			June,			Monthly Average.			June,			Monthly Average.			June,		
	1883.	1884.	1885.	1885.	1884.		1883.	1884.	1885.	1885.	1884.		1883.	1884.	1885.	1885.	1884.	
	Tons.	Tons.	Tons.	Tons.	Tons.		Tons.	Tons.	Tons.	Tons.	Tons.		Tons.	Tons.	Tons.	Tons.	Tons.	
France	3538	2737	2294	2294	2513		2477	1621	630	476	2064		6015	4358	2924	2323	4577	
Holland	2352	3580	4206	3768	2456		1853	1948	1582	1383	2941		4205	5528	5788	5151	5397	
Germany & Austria	588	552	933	971	756		1854	2380	3498	2271	2621		2442	2932	4431	3242	3377	
Belgium	319	183	239	232	224		124	151	134	123	75		443	334	373	355	299	
United States ...	226	962	702	1615	2784		294	3386	11488	22542	7105		520	4348	12190	24157	9889	
Other Countries ..	..	..	2	..	..		61	121	14	1	528		61	121	16	1	528	
Total	7023	8014	8376	8433	8733		6663	9607	17346	26796	15334		13686	17621	25722	35229	24067	

SUGAR STATISTICS—GREAT BRITAIN.

To JULY 18TH, 1885 AND 1884. IN THOUSANDS OF TONS, TO
THE NEAREST THOUSAND.

	STOCKS.		DELIVERIES.		IMPORTS.	
	1885.	1884.	1885.	1884.	1885.	1884.
London	102	111	187	200	199	224
Liverpool ..	117	112	155	154	161	189
Bristol	5	5	32	31	32	30
Clyde	95	67	132	134	178	140
Total ..	319	295	506	519	570	583
	Increase.. 24		Decrease ..13		Decrease ..13	

SUGAR STATISTICS—UNITED STATES.

(From Messrs. Willett & Hamlin's Circular, New York.)

FOR THE FOUR PRINCIPAL PORTS. IN THOUSANDS OF TONS, TO THE
NEAREST THOUSAND. FOR JUNE 1885 AND 1884.

	STOCKS.		DELIVERIES.		IMPORTS.	
	July 1st,		For June,		For June,	
	1885.	1884.	1885.	1884.	1885.	1884.
New York	122	142	61	62	73	74
Boston	41	32	21	21	31	20
Philadelphia....	8	7	13	11	14	12
Baltimore .....	..	1	..	..	..	..
Total.....	171	182	95	94	118	106
	Decrease.. 11		Increase.. 1		Increase.. 12	
Total for the year ..	..	..	607	547	688	667

In the case of Baltimore, where nothing is put down, it means that the Stock, Imports, and Deliveries, do not exceed 500 tons in each case.

NEW YORK PRICES FOR SUGAR.

From Willett, Hamlin & Co.'s Report, July 16th, 1885.

FAIR REFINING.	96° CENTS.	GRANU- LATED.	STAND. A.	STOCK IN FOUR PORTS.
July 16, 1885.—5½c.	6½c.	6 9-16-¾c.	6½c.	Jan. 1, 1885—89,186 tons.
July 17, 1884.—5c.	5 15-16c.	6¾c.	6¼c.	Jan. 1, 1884—60,900 tons.
July 19, 1883.—6 11-18c.	7½c.	8 15-16c.	8¾c.	Jan. 1, 1883—50,297 tons.
July 20, 1882.—7¼c.	8 1-16c.	9¾c.	8¾c.	Jan. 1, 1882—43,927 tons.
July 21, 1881.—7¾c.	8½c.	9½-10c.	9 7-16-½c.	Jan. 1, 1881—66,999 tons.
July 15, 1880.—7 11-16c.	8¾c.	9½-10c.	9½-¾c.	Jan. 1, 1880—63,558 tons.
July 17, 1879.—6¾c.	7¾c.	8¾c.	8¼-¾c.	Jan. 1, 1879—50,773 tons.
July 18, 1878.—7 3-16c.	8c.	9¼c.	9½-¾c.	Jan. 1, 1878—48,230 tons.
July 19, 1877.—9¾c.	10¼c.	11¼c.	11¾c.	Jan. 1, 1877—25,885 tons.

STOCKS OF SUGAR IN THE CHIEF MARKETS OF EUROPE ON THE
31ST MAY, FOR THREE YEARS, IN THOUSANDS
OF TONS, TO THE NEAREST THOUSAND.

Great Britain.	France.	Holland	German Empire.	Austria.	Remaining four principal entrepôts.	TOTAL 1885.	TOTAL 1884.	TOTAL 1883.
306	204	43	140	38	27	758	675	526

CONSUMPTION OF SUGAR IN EUROPE FOR THREE YEARS, ENDING
31ST MAY, IN THOUSANDS OF TONS, TO THE
NEAREST THOUSAND.

Great Britain.	France.	Holland	German Empire.	Austria.	Remaining four principal entrepôts.	TOTAL 1885.	TOTAL 1884.	TOTAL 1883.
1190	460	48	388	196	328	2610	2488	2388

ESTIMATED CROP OF BEET ROOT SUGAR ON THE CONTINENT OF EUROPE,
FOR THE PRESENT CAMPAIGN, COMPARED WITH THE ACTUAL CROPS
OF THE THREE PREVIOUS CAMPAIGNS.

(From Licht's Monthly Circular.)

	1884-85.	1883-84.	1882-83.	1881-82.
	Tons.	Tons.	Tons.	Tons.
France.....	325,000	473,676	423,194	393,269
Germany Empire ..	1,150,000	986,403	848,124	644,775
Austro-Hungary....	540,000	445,952	473,002	411,015
Russia and Poland ..	370,000	307,697	284,991	308,799
Belgium	90,000	106,586	82,723	73,136
Holland and other Countries.....	50,000	40,000	35,000	30,000
Total.....	2,525,000	2,360,314	2,147,034	1,860,994

Mr. Licht's present estimate is the same as those of the two previous months.

STATE AND PROSPECTS OF THE ENGLISH SUGAR MARKET.

The market for both raw and refined sugars has been dull throughout the month; towards the close a better feeling existed, with some improvement in prices. Still, as compared with last month, quotations are now from 6d. to 1s. 6d. per cwt. down; the reduction being most marked in Javas and Cuba Centrifugals. The large and increasing imports of American refined, which in June exceeded 24,000 tons, are seriously affecting our refiners, who are curtailing their purchases, and in some cases their production, to the narrowest limits. At one period during the month the price of 88 per cent. beet, f.o.b., fell to 14s.; the latest quotations are 15s. 6d. to 15s. 9d., August, 16s., September, and 16s. 4½d., October-December.

The stocks of raw sugars in Europe continue heavy, and, as compared with a year ago, are some 70,000 tons in excess. The stocks in the United States, on the other hand, show a decrease of about 6,000 tons. Taking into account the increase in the world's consumption, and that the United States will have to fall back upon European supplies to make up her requirements for the present year, this surplus of 65,000 tons will shortly be extinguished.

On the 18th July the deliveries in the United Kingdom show a decrease as compared with the same period of 1884, of 13,292 tons, and the imports show a decrease of 13,537 tons.

The imports of American refined for the six months ending June 30, were 73,146 tons, against 24,552 tons for 1884.

The stocks, on the 18th July, in the United Kingdom, were 318,831 tons, against 295,117 tons in 1884, and 245,148 tons in 1883.

Present quotations for the standard qualities, as under, are:—


FLOATING.		Last Month.
Porto Rico, fair to good Refining	15/3 to 15/9 against	16/- to 16/6.
Cuba Centrifugals, 96% polarization	16/9 to 17/3	„ 18/3 to 18/6.
Cuba Muscovados, fair to good Refining ..	15/3 to 15/9	„ 16/- to 17/-.
Bahia, middling to good Brown, No. 7 to 8½	13/- to 14/6	„ 13/6 to 15/-.
Pernambuco, good to fine Brown	15/- to 15/3	„ 15/6 to 15/9.
Java, No. 14	17/6 to 17/9	„ 19/- to 19/3.
LANDED.		Last Month.
Madras Cane Jaggery	10/6 to 11/- against	11/6 to 12/-.
Manilla Cebu and Ilo Ilo	10/6 to 11/-	„ 11/6 to 12/-.
<hr/>		
Paris Loaves, f.o.b.	19/6 to 20/-	„ 20/- to 20/6.
Titlers	20/6	„ 21/6
Tate's Cubes	22/-	„ 23/-
Austrian-German Beetroot, 88% f.o.b. ..	15/6 to 15/9	„ 16/- to 16/3.

THE SUGAR CANE.

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 The writers alone are responsible for their statements.

N.B.—All communications to be addressed, and Cheques and P.O. Orders made payable to HENRY THORP, Ducie Chambers, 57, Market Street, Manchester.

For Scale of Charges for Advertisements, see page xi.

For Table of Contents, see opposite the last page of each Number

On the 7th of last month an important deputation waited upon the Marquis of Salisbury, on the subject of the Sugar Bounties. A full report of the proceedings will be found at page 455.

In no other European country is home-produced sugar so highly protected as in Russia, and yet the Russian sugar industry has of late times (see July *Sugar Cane*, page 362) been suffering equally with their neighbours from the same cause—namely, over-production. The Russian Government have recently passed a law by which the sugar manufacturer will obtain an export bounty equal to about 6s. 3d. per cwt.; but the limit within which this can be done is the 1st January, 1886, and the quantity exported is not to exceed 32,250 tons. The correspondence which has taken place between our Refiners' Committee and the Board of Trade on the subject will be found at page 463.

Our Refiners' Committee have also been in correspondence with our Foreign Office, with respect to the American Export Bounties (see page 466). The Americans themselves are beginning to see the folly of the existing system of drawbacks upon sugar exports. In a recent number of *Bradstreet's* (New York) there appeared an article strongly condemning the whole system, and which concludes as follows: "If we are to have subsidies, why should the sugar refining monopolists be the favoured ones?" (see page 465).

The sugar estate known as Bôg, in the parish of Clarendon, Jamaica, consisting of 1,120 acres, is advertised for sale by Messrs. Hards and Jenkinson, at their auction mart, Tokenhouse Yard,

London, E.C., on the 11th of November next. For fuller particulars, see page 23 of our advertisements.

There has been a great shifting amongst the colonial governorships. Sir Henry Bulwer, Governor of Natal, has been appointed High Commissioner for the Island of Cyprus; his place in Natal is taken by Sir Arthur E. Havelock, Governor of Trinidad, who in turn is succeeded by Sir William Robinson, Governor of Barbados. Sir Charles Cameron Lees, Governor of the Leeward Islands, takes the Governorship of Barbados. He gets an increase in salary of £1000. The only positively new colonial appointment is that of Lord Gormanston, premier Viscount of Ireland, to be Governor of the Leeward Islands, with £3000.

According to the circular of Messrs. Hanschell & Company, of Barbados, "the sugar crop is now drawing to a close throughout the islands, but there still be produce left for shipment in several ports until the end of August. A couple of vessels of 400 to 500 tons are wanted for sugar from Jamaica to Halifax, and one or two might also find employment for Montreal. From Barbados the aggregate shipments to date comprise 44,446 hogsheads of sugar and 27,720 puncheons molasses, and it is estimated that about 20,000 hogsheads are yet to go forward.

The following is taken from the Demerara *Argosy*:—"In Barbados, where the highest Muscovado sugar has always been made, a competitive trial was made between two parcels of canes of equal weight—one converted into Muscovado sugar, the other into crystals. The canes at Jordan's gave 7 hhds., of 21 cwts. each, Muscovado, and 385 gallons molasses. The canes at Bulkeley's gave fully 6 tons of crystals, 2 tons second quality of sugar, and 350 gallons of molasses. Allowing for the extra cost of making the latter, its value exceeded that of the common process by about £40."

We have nothing further to report respecting the "Electric Sugar Refining Co.," except that we have received the analysis of the raw sugar used in the experiment, the particulars of which we gave last month. This analysis will be found at page 490. What is wanted is the evidence of one or more disinterested persons who have *seen the thing done*.

THE FOREIGN BOUNTIES AND THE APPROACHING GENERAL ELECTION.

Lord Salisbury's speech in reply to the very able statement of Mr. McLean at the workmen's deputation last month, which is reported in this month's issue, has at last hit the right nail on the head. Lord Salisbury is right; all the despatch writing in the world and the most skilful negotiations of the Foreign Office are worse than useless for the abolition of foreign bounties unless Parliament first sanctions the imposition of countervailing duties. It is well for the home and colonial sugar interests to know the truth. One only remedy for their grievance is the imposition of a countervailing duty. To a British Legislature and not to foreign Governments appeal must be made. On the eve of a general election our duty is clear. The electors must know the truth about foreign bounties; must be told how foreign workmen are securing the work and wages of our own men not by free-trade competition, but by a protectionist device invented for the specific purpose of destroying free-trade competition on our home market, and thus securing for foreign labour the work and wages generated by the consumption of sugar in this country. If the electors are adverse to foreign bounties they will readily assent to their being taxed off by countervailing duties. Every economist knows that no greater or other effect could be produced on the consumers' interest by countervailing duties than would be produced by the abolition of bounties. Any one objecting to a countervailing duty is no Free Trader, but a supporter of foreign protection, and an enemy of our working classes. The only statesman opposed to Mr. Gladstone in his objection to bounties—"concealed subsidies," he calls them—is Mr. Chamberlain. The late President of the Board of Trade, with the assistance of Mr. Giffen, actually attempted to make out a case in favour of foreign bounties. But Mr. Giffen's *own* figures showed that whilst for many years before bounties, the now bounty-aided countries which have secured 50 per cent. of our consumers'

demand for sugar, could not then secure more than 5 per cent. But the present Board of Trade are likely to take a very different view as to the foreign bounty system. Whilst Mr. Chamberlain was in office the officials of the Board of Trade actively opposed the efforts of the workmen to secure public support in their agitation against this unsound system. This will not now be allowed. It may be noticed that Lord Salisbury said nothing against the principle of countervailing duties. He did not even hint that our commercial treaties raised any difficulty. But Sir Michael Hicks-Beach, in a subsequent speech at Bristol, suggested some difficulties in connection with treaty engagements. We believe, however, that steps are being taken to ascertain the views of the law officers on the point. It has always seemed to us that a country granting export bounties violates the essential principle of the most-favoured nation article. This was the opinion of Professor Sheldon Amos and Mr. Wallwyn P. B. Shephard, who, in reply to a communication from the workmen's committee, fully considered the point some years ago, and their joint opinion may be found in the pages of this Magazine in 1880. If export bounties are contrary to the principle of the most-favoured nation article the States which grant them would have no juridical grounds for objecting to our imposing such a duty as would intercept their export bounty. How could they appeal to a treaty article which they themselves must be taken to have broken? We hope the National Anti-Bounty League will get the question as to our commercial treaties precluding countervailing duties raised and satisfactorily settled. It ought to be cleared up before the General Election. Are or are not export bounties contrary to the spirit and intention of the most-favoured nation article? That is the question. Surely, international lawyers ought to be able to pronounce a definite opinion on this point. We have little doubt as to what their opinion will be.

FOREIGN SUGAR BOUNTIES.

IMPORTANT STATEMENT BY LORD SALISBURY.

One of the largest deputations that ever waited on a Minister had an interview with Lord Salisbury, with whom was Lord Dunraven, at the Foreign Office, on the 7th ult., on the subject of the foreign sugar bounty system. It numbered about 150 persons, and comprised workmen's delegates specially elected to attend by their fellow-workmen engaged in various branches of home industry connected with the British colonial and home sugar production and manufacture. Among those present were The Right Hon. Sir R. N. Fowler, Bart., M.P., Lord Mayor of London; W. E. M. Tomlinson, Esq., M.P.; Lieut.-Col. and Alderman Cowan; Neville Lubbock, Esq., and Quintin Hogg, Esq., the Chairman and Deputy Chairman of the West India Committee; W. Middleton Campbell, Esq., Honorary Treasurer of the National Anti-Bounty League; F. M. Alleyne, Esq., and W. P. B. Shephard, Esq., the Honorary Secretaries of the National Anti-Bounty League; Frederick Lubbock, Esq.; and F. W. Butterworth, Esq., Members of the Council of the National Anti-Bounty League; J. L. Ohlson, Esq., Secretary of the West India Committee; Mr. James Worsnop, Mr. B. Prior, Mr. T. Wiginton, Mr. John McLean, Secretary, Scottish Workmen's Association for Abolition of the Foreign Bounties; Mr. S. McKirdy, Mr. Alexander Lyle, Mr. David M'Coll, Mr. John Howie (Glasgow), of the Amalgamated Porters Association of Scotland; and Mr. G. Jenkinson, Mr. Thomas Ellis, and Mr. Robert Thomas Jack, of the East and West India Docks; Mr. George Ferguson, Engineer, Greenock; Mr. Josiah Gould, Mr. John Atkins, Mr. John Lay, Mr. William Lord, Mr. S. W. Maddocks, Birmingham, President of the National Society of Amalgamated Brass Workers; Mr. Webz, Mr. Hans Reinicke, Mr. John Hine, Mr. Thomas Nicole, Mr. George Roe, Mr. John Mitchell, Mr. John Chandler (Riverside Workmen Association); Mr. Samuel Peters, Secretary of the Workmen's National Association for the Abolition of Foreign Bounties; Mr. William J. Booth (Derby), Engineer; Mr. Richard Milner (Derby), Engineer; Mr. William Watson, Mr. William Moss (Nottingham), Engineer; Mr. T. Manley, Mr. George Higgins (Bristol), West of England Labourers Society; Mr. W. B. James, Mr. John Ball,

Mr. Robert M. Liddell (Liverpool), Engineer; Mr. H. Gully, Mr. W. A. Knapman, Mr. Thomas M. Kelly, Dock and Riverside Labourers' Society, and other delegates from Docks and Factories.

The deputation was introduced to the Prime Minister by the Right Honourable the Lord Mayor of London, M.P., who said: This deputation comprises workmen delegates specially elected to attend by their fellow-workmen engaged in the following various branches of home industry connected with the British colonial and home sugar production and manufacture, viz. :—

Sugar-Machinery Engineers.

Journeymen Coopers.

Coppersmiths.

Brass-Workers.

Dock and Riverside Labourers.

British Seamen.

Watermen and Lightermen.

Sugar-refining Operatives.

Animal Charcoal Burners.

Riggers and Sail-Makers.

Hoop Benders.

Dock Carmen.

Besides delegates from London factories, works, and docks, delegates on behalf of fellow-workmen in factories and works in Liverpool, Plymouth, Derby, Nottingham, Greenock, Glasgow, Leith, Bristol, and Birmingham are in attendance, many of the workmen having travelled all night in order to be present.

One of the workmen has been deputed to make, on behalf of this deputation, a general statement, pointing out the terrible injury to the best interests of British labour inflicted by the foreign bounty system.

Mr. M'LEAN, Secretary of the Scottish Workmen's Association for the Abolition of Foreign Bounties, then read the following statement, which had been unanimously adopted at a preliminary meeting of the delegates :—

This deputation desires to approach your Lordship, as Prime Minister and Secretary of State for Foreign Affairs, upon the broad question as to whether our national labour at home and in our colonies is any longer to remain subjected on the home market to the bounty-aided competition of foreign labour.

This most important and material question for our British and Colonial workmen arises out of the long-continued system of the foreign export sugar bounties.

This system was fully investigated by the Select Committee of the House of Commons on the sugar industries in 1879 and 1880.

Five years have elapsed since the termination of that most exhaustive

inquiry ; but no steps in the direction recommended by that Committee having been taken, the condemned bounty system has extended, and its pernicious effects upon the welfare of our home and colonial labour have materially increased.

Whether there be commercial depression or commercial prosperity, these export bounties are most prejudicial to the best interests of British labour, both at home and in our colonies.

These bounties divert legitimate employment from British to foreign workmen, and thus directly tend to lower our wages and to render our employment as workmen intermittent and precarious.

The enormous consumption of sugar in the United Kingdom is a natural stimulus to the production of sugar. This production gives vast employment to labour, both skilled and unskilled.

But this system of export bounties has secured for foreign bounty-aided labour more than half of the work and wages our national consumption of sugar generates.

Last year all foreign refined sugar and unrefined beet-sugar, which together amounted to 51 per cent. of our total imports, was exported from countries granting bounties ; whilst before the era of bounties these same countries failed to contribute more than 5 per cent. of our total imports. In a few more years, if the present rate of increase of bounty-aided sugar continues, the only sugar sold on British markets will be the very foreign product which, by reason of its natural inferiority, requires the aid of this pernicious protectionist device.

Within the limits of Great Britain and her Colonies there exist all the natural elements of industrial success in sugar production and manufacture. The climate of our tropical possessions in the East and West Indies, our unrivalled commercial credit and banking facilities, our highly organized skill labour, are all natural elements of industrial success. But the arbitrary intervention of foreign State bounties has neutralized these our natural advantages in the international competition on our home markets, and foreign workmen instead of British home and Colonial labour have gained the employment our increased consumption of sugar has generated.

The German and other continental sugar bounties have long existed, and are still maintained in full force against British labour at home and in our Colonies.

But the most recent illustration of the effect of bounties is afforded by America. The imports of sugar from America were, in

1882, without bounties	2,000 tons.
1883, partly with bounties	6,200 „
1884, wholly with bounties	52,000 „
1885, for six months only	73,000 „

Under these circumstances we venture most earnestly to protest

against any further delay on the part of the British Government in initiating such steps as shall secure the speedy, complete, and permanent cessation of all export bounties by rendering them inoperative on our markets; and it is the firm conviction of the workmen-delegates on this deputation that the only measure effectual to redress the injury inflicted upon British labour at home and in our Colonies by foreign bounties is the enactment of some specific countervailing duty on all bounty-aided sugars, whilst at the same time all other sugars, whether British or foreign, are admitted free of all duties whatsoever.

In supplementing the statement Mr. M'LEAN said he had been asked by the workmen who had deputed him to come here to urge on his Lordship the importance of trying to do something to prevent an old and honourable branch of Scottish industry from being crushed out. They were being crushed out at the present time not by legitimate and Free Trade competition. Were it legitimate and Free Trade they would have no cause to complain; but it was because it was illegitimate, protectionist and unjust that they asked the Government to help them to get redress. He was also earnestly requested to urge on his Lordship that they did not want Protection. They had never asked Protection. In a communication recently addressed to him as Secretary of the Scottish Workmen's Association by the late President of the Board of Trade, that right hon. gentleman stated that bounties were an infraction of Free Trade principles. Now, they wanted that infraction removed, they wanted Free Trade restored on the British sugar markets, they wanted a fair field and no favour. They asked for themselves nothing in the way of advantage which they were not willing to grant to every nation in the world. If they in this country had a fair field, he was persuaded, from what he knew of those who were engaged in the industry, from the skill of those that were employed, and the capital that was embarked, that they could hold their own with any country in the world.

Mr. BOOTH, sugar machine engineer, Derby, said that the town from which he came had suffered very much through the decline in export of sugar machinery to the West Indies. A large number of men had been thrown idle, and unless a remedy were speedily found the bitter cry in the East End of London would be extended to the provinces. The state of matters in Nottingham was the same as in Derby, and Liverpool had also suffered very largely.

Mr. LEMON spoke on behalf of the seamen of the port of London, to whom he said the operation of the bounty system on the West India sugar trade caused a loss of occupation and wages.

Mr. GEORGE FERGUSON, Greenock, said that the town which he represented was one of the most important centres of the shipping of sugar industries. Throughout all her history Greenock had been dependent to a very great extent on her shipbuilding and sugar refining. During

his five years' apprenticeship as a marine engineer he worked on steamers which were being built in Greenock for French firms. At that time they were not bounty-fed, but for several years past there had been no French steamers built in that district, one result of which was that thousands of workmen had been thrown out of employment. Four or five of the sugar refineries in Greenock were at present closed, and there was the prospect of a few more being closed within this week. On behalf of his fellow-workmen in Greenock and Glasgow, and indeed in all Scotland, he earnestly asked his Lordship to do his utmost to remedy this. He asked it on behalf of our trade and commerce, and of the tens of thousands of workmen and their wives and children who had been in a state of semi-starvation for some years past through these foreign bounties. They looked to his Lordship to get rid of this evil, either by the adoption of a countervailing duty or any other measure that seemed best to the Government. If they accomplished that object the Government would receive the gratitude of thousands upon thousands of their fellow-subjects throughout the length and breadth of the land. (Cheers.)

Mr. P. KELLY addressed his Lordship on behalf of the dock and river-side workmen, and said: The maintenance of the foreign bounty system operated to diminish the employment of labour in our docks, and much of the distress in the East End of London among the labouring classes—distress which culminated in the destitution which originated the "Bitter Cry" of outcast London—was due to the lack of work owing to the competition of bounty-aided foreign labour. The workmen wanted work and wages, not charity. Given work wages the men would do their duty to home and family. Mr. Gladstone, in reply to the Workmen's Committee had said that "he was not in favour of the concealed subsidies of a Foreign State to a particular industry with the effect of crippling and distressing capitalists and workmen engaged in a lawful branch of British Trade." If both Liberal and Conservative statesmen were adverse to foreign bounties, and successive Administrations had endeavoured to abolish them by treaty engagements, why should any objection be made to a countervailing duty. (Cheers.) As regards prices and the interests of the consumer, such a duty could have no greater effect than the abolition of bounties. Having failed to procure the abolition of bounties by negotiation, the working men of the country could not understand why Her Majesty's Government did not arrive at the desired result by countervailing duties.

Mr. SAMUEL PETERS reminded his Lordship that he was the first Minister who had received a public deputation some years ago on the sugar bounty question, and he hoped he would be the last. (Cheers). They had fought this important question to the front by public meetings in every part of the Kingdom, and were convinced that the

public were on the side of the workmen, who were the real sufferers from this protectionist competition of foreign labour on the home market. Mr. Alderman Cowan, who was a candidate for Parliament in one of the metropolitan districts which had been severely hit by the foreign bounty system, and Mr. Quintin Hogg, who had so philanthropically devoted himself to the advancement of the working classes, had been asked to say a few words in support of the workmen's views.

Mr. Alderman COWAN said this was not the case of a depressed trade, it was the case of a suppressed trade. (Cheers.) Any trade could be suppressed if, after exclusion from foreign markets, its market in this country was also to be subjected to the machinations of protectionist foreigners. There was no doubt that this bounty system, which had worked so injuriously to this country, had been found to work for the interests of labour in the countries which had employed it, so much so that other articles besides sugar were now finding their way into competition with British labour by reason of the bounty system. But what work foreign labour gained British labour lost. He was confident that in his Lordship's hands this question would be adjusted, and that justice would be done to British labour by the party of which his Lordship was the distinguished head.

Mr. Neville Lubbock and Mr. Quintin Hogg were prepared to speak in support of the views of the deputation, but, owing to pressure of time, the Lord Mayor did not call upon them.

The Marquis of SALISBURY: My Lord Mayor and Gentlemen, I do not need the presence of so important and influential a deputation as this to convince me that this is one of the gravest questions with which we have to deal in our time. I know well all the suffering which is being endured on account of the present condition of trade. I have no sympathy with those who tell us that you make a mistake and that your trade is not depressed, and who are ready to prove to you by figures that you are getting on very well. My impression is that those who wear the shoe know where it pinches. I do not doubt—I cannot doubt—that a severe blow is inflicted on our British industry by the creation of a large amount of purely artificial competition. (Cheers.) It is very sad to see a great industry withering from such a cause. But when you ask me what remedy I should apply, I would offer some plea on behalf of the office which I represent. Year after year now for many years the Foreign Office has been appealed to put a stop by negotiation to this evil, as though there were some magic in negotiation, and that by much despatch-writing you could do what you like. The matter does not lie with the Foreign Office. It lies all in the question whether you are or are not absolutely precluded by principle from adopting any kind of countervailing duty. The matter is there as in a nutshell; and that is not a matter for the Foreign Office, it is not a matter for the

Ministry, it is not now a matter for the Parliament which is verging to its close and which can undertake no more business, it is a matter for the constituencies of the country. (Loud cheers.) Mr. Peters, I think, told us that the public were on his side. Well, the widest possible public will have the freest possible means of expressing its opinion, and if the public is on his side there is little doubt what the result will be. But do not imagine that the Foreign Office can help him unless the public make up its mind on this great question. I remember reading in one of the papers in connection with this question, I think about a year ago, that the late President of the Board of Trade directed a reply to be sent to a Gentleman in this room to the effect that he was willing to have a conference to negotiate on this question on one condition only, that every idea of countervailing duty beforehand was abandoned. (Laughter.) Now, with great deference to so great a name, that seems to me the very last position which we can adopt. (Cheers.) If it is the will of the people of this country that the principles which are involved in the idea of reciprocity, and countervailing duties, and so forth, were absolutely inadmissible, that they are wrong in principle, and that no shred of them must ever be admitted, if that is the will of the people of this country, be it so; but, then, any evil that the bounties do, will continue, and you must not expect that any negotiations or any power the Foreign Office can exercise will put a stop to the evil. Asking us to go into negotiations when we are absolutely bound by the accepted doctrines of the day to propose no countervailing duty is imposing upon us a harder task than Pharoah's taskmasters ever imposed. You are asking us to make bricks without straw, to go into the market and buy without money, to go to war and fight without weapons. What is the use of our going to foreign Powers? Do you imagine that supplication, or preaching, or exhortation, or lectures, or political economy will affect their policy? Would it affect any of yourselves? What would you be affected by if somebody came to bargain with you? By something that would appeal to your interest one way or another, and foreign Powers are in that respect very much like individuals. If it is the pleasure of the people of this country to give to the Foreign Office the power of saying this—"Unless you are able to find some means of alleviating this which we conceive to be an injury, it is in our power, and we shall exercise that power, of raising a countervailing duty." If a negotiator were able to go into the negotiations with that message I have no doubt the negotiations would assume a satisfactory aspect. (Cheers.) But if you send him into negotiations announcing to all the world beside that he can do neither harm nor good, that he is tied up in his own theories, that he is absolutely powerless, that he has nothing in his hands but lectures of exhortation and supplica-

tions, you might well spare yourself the trouble, and the somewhat humiliating attitude you will have to assume. And now I hope that this matter will really be grappled with. The British public, if they have a fault, is that of imagining that they can enjoy simultaneously the advantages of two totally opposite systems. People seem to imagine that they can enjoy whatever the advantages are of absolutely denouncing the countervailing duties, and also the advantages of exercising that influence on the minds of foreign countries which a fear of countervailing duties would exercise. It is not so. You must make up your minds what course you would follow. It is not with us, it is not with any individual statesman, it is not with any particular party, but it is for the electors of this country to determine what line we shall take on this great question. It is with them to decide the issue which you have presented to me to-day. I do not wish to pronounce dogmatically on a matter which the Royal Commission that is shortly to be appointed will no doubt examine to the bottom. My own view is, and always has been, that the power of modifying your fiscal system in order to defeat any oppressive action on the part of foreign countries is a power which ought very rarely to be exercised, but which you ought to possess, and if you are known to possess it it will be very seldom necessary for you to exercise it. (Cheers.) I am far from advocating a general practice of retaliatory tariffs, and still further from advocating anything approaching to Protection, but I believe that freedom from self-imposed trammels of particular theories is necessary if you mean to deal with the world as it is, and with the statesmen of this present time of foreign countries who are animated by principles very different in these matters from yours, and it is only by a free and bold action in this respect that you will obtain the equality between industries which is your natural and legitimate desire. I earnestly hope that the people of this country will think over these matters, and I hope that in some way or other foreign Powers may be induced to abandon this system of bounties, which is not in the long run good for themselves, and which is so deeply injurious to us. I can assure you that with whatever weapons you are pleased to put into their hands the Foreign Office will earnestly struggle to attain such an end. (Cheers.)

Mr. JOHN HOWIE, Glasgow, in thanking Lord Salisbury for his reception of the deputation, said that the French Government had stated their willingness to enter into negotiations for the abolition of foreign bounties on condition that the British Government would impose a countervailing duty against any country that refused to refine in bond. He mentioned that in support of the position the noble Marquis had taken on this question.

The deputation then withdrew.

A RUSSIAN EXPORT BOUNTY.

The following letters, addressed to Lord Salisbury by the Sugar Refiners' Committee, have received the accompanying reply from the Board of Trade, confirming the statements contained in them :—

21, Mincing Lane, 11th August, 1885.

The Most Hon. the MARQUIS OF SALISBURY, K.G.,
Secretary of State for Foreign Affairs.

My Lord Marquis,—I am desired to bring to your Lordship's notice a paragraph in a Berlin newspaper, *Die Deutsche Zuckerindustrie*, of the 24th July, of which the following is a translation :—

“RUSSIAN EXPORT BOUNTY.

“According to the *Nowosti* a decree has been issued that manufacturers shall receive a return of 65 kopeks for duty, and a bounty of one rouble, on every poud of sugar exported. This decree is to remain in force from the autumn of the present year until the autumn of the year 1887.”

As this is very alarming news, I am desired to ask whether your Lordship would kindly obtain for us, through the commercial department of the Foreign Office, some reliable information on the subject.

I am, My Lord Marquis,
Your obedient servant,
GEORGE MARTINEAU,
Secretary, British Sugar Refiners' Committee.

21, Mincing Lane, 13th August, 1885.

The Most Hon. the MARQUIS OF SALISBURY, K.G.,
Secretary of State for Foreign Affairs.

My Lord Marquis,—With reference to my letter of the 11th inst., I beg to forward to you the following paragraph from *La Sucrerie Indigène*, a Paris paper of the 11th inst. :—

“LE DRAWBACK DES SUCRES EN RUSSIE.

“Un Ukase promulgué le 7 de ce mois ordonne, pour les sucres exportés à l'étranger, le remboursement intégral des droits perçus sur la fabrication de ces produits. Une prime d'un rouble par poud sera en outre payée aux exportateurs.

Ce privilège restera acquis jusqu'au 1^{er} Janvier, 1886, pour l'exportation en Europe et jusqu'au 1^{er} Juillet suivant pour l'exportation en Asie. Toute fois, l'application en cessera dès que l'exportation aura atteint deux millions de pouds."*

I am, My Lord Marquis,

Your obedient servant,

GEORGE MARTINEAU,

Secretary, British Sugar Refiners' Committee.

Office of Committee of Privy Council for Trade,

17th August, 1885.

Sir,—I am directed by the Board of Trade to acknowledge the receipt of your letters of the 11th and 13th instant, addressed to the Secretary of State for Foreign Affairs, on the subject of the recent issue of a decree by the Russian Government authorising the payment of a bounty upon sugar exported.

In reply, I am to forward to you, for the information of the Sugar Refiners' Committee, the accompanying copy of a Despatch from Her Majesty's Ambassador at St. Petersburg, with enclosure, from which it will be seen that the statement published in the Paris journal, *La Sucrerie Indigène*, referred to in your letter of the 13th instant, is substantially correct.

I am, Sir,

Your obedient Servant,

ALLEN STONEHAM.

Geo. Martineau, Esq.,

Secretary of the British Sugar Refiners' Committee,

21, Mincing Lane, E.C.

St. Petersburg,

August 8th, 1885.

My Lord,—I have the honour to transmit herewith a translation, which has appeared in to-day's *Journal de St. Petersbourg*, of a decree issued by the Minister of Finance, and approved by the Emperor, ordering the payment of a bounty on Russian sugar when exported.

This bounty is fixed at a rouble (about two shillings) per pound (equal to thirty-six pounds English) of exported brown and refined

*The bounty of one rouble per pound is £6 4s. 3d. per ton. The limit of two million pouds is 32,250 tons. The sugar made in the Russian sugar factories is all in the form of white crystallized.

sugars. It will be allowed upon these sugars exported until January 1st, 1886, and upon those exported to Persia and the Asiatic markets till the 1st July, 1886.

This bounty is to be repaid by the manufacturers on the payment of the excise upon the sugar produced in 1885-1886 and 1886-1887.

The bounty will be paid only on sugars containing $99\frac{1}{2}\%$ of sugar, and will cease when two millions of pouds shall have been exported.

I have, &c.,

(Signed) EDWARD THORNTON.

The Right Honble.

The Marquis of Salisbury, K.G.,

&c., &c.

[ENCLOSURE.]

Par un avis du comité des ministres, approuvé par S. M. l'Empereur et rendu conformément au rapport du ministre des finances sur les encouragements à accorder à l'exportation du sucre russe, il est ordonné :

I. A l'effet d'encourager le transport du sucre indigène à l'étranger il sera payé, outre le remboursement de l'accise, une prime spéciale de *un rouble* par poud de cassonade ou de sucre raffiné exporté. Cette prime sera acquise aux conditions suivantes :

(a.) Elle ne sera délivrée que pour le sucre exporté jusqu'au 1^{er} Janvier, 1886 ; le sucre exporté en Perse et sur les marchés d'Asie jouira de la prime jusqu'au 1^{er} Juillet, 1886.

(b.) La somme totale des primes payées sera remboursée par les fabricants de sucre lors du versement de l'accise pour le sucre produit en 1885-1886 et en 1886-1887. On en fera la répartition par poud de sucre produit par les fabriques de l'Empire et du royaume de Pologne.

(c.) Ne seront passibles de la prime que les sucres raffinés et la cassonade de première qualité contenant pour 99.5% de sucre au moins, et

(d.) La prime cessera d'être payée dès que la quantité du sucre exporté atteindra le chiffre de 2 millions de pouds.

II. Le ministre des finances est autorisé : à promulguer des règlements détaillés pour l'ordre à suivre en vue de la délivrance de cette prime et de son remboursement au trésor, et b. d'élaborer un projet en vue de l'abaissement de la taxe sur le sucre importé et de le soumettre à l'appréciation du conseil de l'Empire.—(*Bulletin des Lois*, No. 81.)

THE BOUNTY ON THE EXPORTATION OF REFINED SUGAR FROM THE UNITED STATES.

The following further correspondence has taken place:—

21, Mincing Lane, 7th August, 1885.

The Most Hon. the MARQUIS OF SALISBURY, K.G., &c., &c.,
Secretary of State for Foreign Affairs.

My Lord Marquis,—I am desired by my committee, in the absence of Mr. Duncan, to request that their thanks may be conveyed to Sir L. S. West, H.M. Minister at Washington, for the copies of the Report on the Sugar Industry of the United States, which were forwarded to our chairman, Mr. Duncan, with Mr. Calcraft's letter from the Board of Trade of the 21st July.

This Report, written by Mr. H. W. Wiley, of the Department of Agriculture, and published at the Government Printing Office, contains in its introduction some important paragraphs in reference to the excessive drawback on the exportation of refined sugar, to which, as confirming our statements, it would be desirable that the attention of the Secretary to the United States Treasury should be directed.

The writer gives in full (pages 26 to 34) the memorandums on the subject which we furnished to the Board of Trade in July and August, 1883, and the report of the Committee of Experts appointed by the Treasury Department at Washington, and proceeds (page 34) to compare the data contained in these documents, remarking that although the bias of self-interest is presumably absent from the report of the Commission, it will appear on careful study to be really in the interest of the American refiners, and that the figures of the Commission are open to serious criticism. He concludes his examination of the subject as follows (page 36):—

“It is evident therefore that the rate of drawback which should be paid on pure sugar exported is 2·49 cents per pound, and this rate should be diminished for less pure sugars *pari passu* with their decrease in saccharine strength as determined by the polariscope.”

It would also be useful, as confirming the statements we have made, to direct the attention of the Secretary to the United States Treasury Department to an article in *Bradstreet's*, a New York commercial journal, of the 25th ult., on “Sugar Drawbacks,” in which it is clearly shown that refined sugar obtains a bounty of at least 43 cents per 100 pounds on exportation from the United States,

and that the refiners have consequently been able to sell pure refined sugar for export at a price actually below the cost of the raw material from which it is made. The writer states that the exports of refined sugar for 1885 have amounted to 83,340 tons, on which the United States Treasury have paid a bounty of over 830,000 dollars. "If we are to encourage foreign trade by subsidy," he says, "let us do it openly and not in the shape of drawbacks that are supposed to pay back to the refiners only the duty paid. If the sugar refiners are to have a subsidy of 14 per cent., then why should not our cotton, wool, iron, and other manufacturers?"

I am, my Lord Marquis,

Your obedient servant,

GEORGE MARTINEAU,

Secretary, British Sugar Refiners' Committee.

Foreign Office, August 13, 1885.

Sir,—I am directed by the Marquis of Salisbury to acknowledge the receipt of your letter of the 7th inst., and to inform you that his Lordship has referred for the opinion of the proper Department of Her Majesty's Government your suggestion that the attention of the United States Treasury should be directed to certain paragraphs in the Report on the Sugar Industry of the United States,* drawn up by Mr. Wiley, of the Department of Agriculture, at Washington.

I am, Sir, your most obedient humble Servant,

T. V. LISTER.

G. Martineau, Esq., 21, Mincing Lane.

THE EFFECT OF THE WORKING OF THE PRESENT SYSTEM OF THE AMERICAN SUGAR DRAWBACKS.

A CLEAR UNVARNISHED STATEMENT OF THE CASE.

From *Bradstreet's*.

The question of the drawback upon refined sugar has been brought before the public by the cablegram of the Associated Press containing the complaints of the British sugar refiners. Like many things done by the daily press they were late, for the complaints in question had been in Washington two weeks previously, having arrived through the mail. Several of the dailies at once set about interviewing, and

* For a notice of this report see "Notes on Books" in the present number.

with characteristic inaptitude sought out those most interested in the maintenance of the present rate—the large sugar refiners. These parties took good care to evade the question at issue, and gave them a certain amount of talk without any practical information. As the subject of drawbacks upon refined sugar must soon come up for consideration, a plain statement of the duties and drawbacks will assist the business community not directly interested in the sugar trade to form an accurate opinion upon the question.

The export of refined sugar is entirely confined to hard sugars, or, to be more explicit, loaf, crushed and granulated. This is because the drawback upon this class of sugar is so large that refiners are enabled to sell them at less than cost. The highest collectable duty upon sugar testing as high as 99° is but 2·36, but the drawback upon granulated testing the same, and in the case of crushed and loaf less, is 2·82 less 1 per cent. This is exactly 43c. per 100 lb. more than the Government receives in duty. But it rarely happens that raw sugar is imported testing 99°, and never for refining purposes. The following table gives the rates of duty upon the average grades used in refining :—

	Degrees.	Duty.
Fair refining testing	89	1·96
Fair refining testing	90	2·00
Centrifugal testing	96 ...	2·28
Beet sugar testing	88	1·92

It is always the object of the importer to get sugar passed under the lowest possible test, therefore it is safe to say that the refiners always get rather under than over the quantity of saccharine the Government collects duty upon. Then, again, they get other advantages, always obtaining more sugar than duty is absolutely paid upon.

It will be clearly seen from the above figures that with a net drawback upon hard sugar of 2·79 our refiners are able to sell to foreigners, through the assistance of our Treasury, sugar at less than cost. Take, for instance, the net price of centrifugal testing only 97°, and the net price less drawback of granulated :—

Centrifugal raw testing 97°	6·00	
Less duty	2·28	
Net	—	3·72
Granulated refined testing 99°	6·37½	
Less drawback	2·71	
Net	—	3·66½
		6½

Nothing could demonstrate the absurdity of the present rate of drawback more clearly than the above. A refiner pays 6½c. per hundred more for raw sugar testing 2° less saccharine than he sells refined for; not, however, to the American consumers, but to foreigners. After

paying the expenses necessary to refining by the assistance of a drawback, which clearly amounts to a subsidy of about 50c. a hundred pounds, our large sugar monopolists are assisted by the Government to increase the cost of sugar to American consumers. That at the very outside the drawback upon hard sugar should not exceed 2'36, as this is the highest collectable duty upon raws, is plain to the most uninitiated, but even this is too high, as granulated sugar can be made at a duty cost of 2'30c. Almost the entire exports of refined sugar are of this kind, and in order to show the inconsistency of our Treasury subsidizing, the patent under which all this class is made is held by James Duncan, a large London sugar refiner. That we should have complaint of the unfairness of the competition from English refiners is only natural. Refiners or any other trade backed by the national Treasury are formidable competitors, and it is only because the question of sugar drawbacks has not been fairly inquired into that unfair competition exists at all. If we are to encourage foreign trade by subsidy, let us do it openly, and not in the shape of drawbacks that are supposed to pay back to the refiner only the duty paid. If the sugar refiners are to have a subsidy of 14 per cent., then why should not our cotton, wool, iron, and other manufacturers? If it is just in one case it is equally so in the other, and in the case of cotton it would be much more just, for not only is the manufacturing done here, but the raw material is grown in the country, besides the number of workmen engaged in its manufacture is twenty fold that of sugar. One firm controls almost the entire trade of the east; at all events it is safe to say that the trade of the entire country is controlled by three firms; and the Treasury assists this monopoly in sustaining prices against the interest of the country at large. Up to date the export of refined sugar has amounted to 83,340 tons, which, taken at 50c. a hundred, has cost the Treasury over \$830,000. All this may not have gone into the pockets of the refiners, as the shipowners have obtained a share, but the fact remains, the Treasury is the loser by this amount.

Besides, this bounty presses hard upon the consumers. They not only have to pay the tax, but during the late rise they were compelled to pay more for their sugar than they otherwise would have done had not the export demand caused by selling sugar to foreigners at less than cost, the Treasury paying the difference, increased prices. While an American consumer is charged 6½c. for granulated, foreign buyers, through the liberality of our Government, can buy it under 3¼c. Certainly it is time that the Secretary of the Treasury asked the sugar commission to commence a comprehensive and impartial inquiry. If we are to have subsidies, why should the sugar-refining monopolists be the favoured ones?

REVIEW OF THE CUBAN SUGAR TRADE FOR THE YEAR 1884.

The year under review has undoubtedly been one of the most fatal to the sugar manufacturing interests in the whole world, and, instead of improving, the situation in which this market closed at the end of 1883, was continually impaired by adverse reports from the United States and Great Britain, to which may be added the disorganised condition of labour and the financial difficulties under which our business men laboured from the beginning, and that were further on increased by the suspension of the Havana Savings, Discounting, and Deposit Bank, and the failure of one of the most important firms on the Northern Coast, which caused serious embarrassments to many others.

Owing to such an accumulation of adverse circumstances, the number of sugar purchasers has been quite limited throughout the year, as besides shippers, speculators have been in previous years an important factor to business, and the future of the staple offering them no enticement to risk their money in this class of speculation, they generally kept aloof after having experienced heavy losses at the very opening of the campaign.

Owing to low prices that have ruled during the greater part of the year for muscovadoes, hardly covering expenses, the production of these classes of sugar considerably decreased, and all planters who manufactured them, found it more advantageous to sell their cane to centrifugal producers than to grind it on their account.

Planters seriously desiring to improve their situation, and having lost all hope of obtaining former prices, began in the course of the year under review to adopt some measures, such as reducing considerably the wages of their labourers and shipping sugar to the United States on their account, a scheme that proved advantageous in some cases and ruinous in others.

Although the prices that ruled in 1884 are without a parallel in the history of sugar during the last 45 years, owing to the total absence of speculation, business in many cases was almost exclusively confined to absolute requirements; the situation was exceedingly trying to all, except consumers, and it is most likely that at the same time as those low prices have led to an increase in the consumption of the world, they have also given a check to the overwhelming increase of the production of both beet and cane sugar, that has brought on this unprecedented depression in prices.

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JANUARY.—In presence of adverse news from abroad and fast accumulating stocks at all the shipping ports of the Island, prices opened ruling very low, and, as they failed in most cases to cover the cost of production, they were accepted only by such planters as were labouring under financial difficulties; but towards the close, better advices were received from New York, and a fair business was transacted in centrifugals at a small advance in prices.

Whilst the greater part of warehouses were overstocked with centrifugals, the supply of muscovadoes and other low classes kept exceedingly light, and owing to that circumstance, prices for the latter descriptions, in which sales were unimportant during the first months of the year, ruled better supported, and were subject to less fluctuations than those for the former.

Extreme prices paid during the month, for all classes, were as follows:—

	1884.	1883.
January.	Rs.	Rs.
Clayed No. 12, for Spain.....	10 a 10 $\frac{1}{4}$	10 $\frac{1}{4}$ a 10 $\frac{1}{2}$
„ „ „ United States ..	5 $\frac{3}{4}$ a 6 $\frac{1}{2}$	7 $\frac{1}{2}$ a 9
Centrifugals, 93/97° test	6 a 7 $\frac{1}{8}$	7 $\frac{1}{4}$ a 8 $\frac{3}{4}$
Muscovadoes, 87/91° test	3 $\frac{1}{4}$ a 4 $\frac{1}{2}$	5 $\frac{1}{2}$ a 6 $\frac{1}{4}$
Mol. Sugars, 85/90° test	3 a 4 $\frac{1}{4}$	5 $\frac{1}{4}$ a 6

FEBRUARY.—During the greater part of the month the market ruled steady, sellers taking advantage of favourable advices from abroad to enhance their pretensions to a point that considerably interfered with business; the only important sales effected being those of several large parcels of centrifugals that changed hands on the coast for speculative purposes. But towards the close, low prices abroad, together with the difficulties to arrange credits here, compelled the greater part of buyers to withdraw from the market.

Extreme prices paid during the month, for all classes, were as follows:—

	1884.	1883.
February.	Rs.	Rs.
Clayed No. 12, for Spain.....	10 $\frac{1}{4}$ a 10 $\frac{1}{2}$	10 $\frac{1}{4}$ a 10 $\frac{1}{2}$
„ „ „ United States ..	6 $\frac{1}{4}$ a 6 $\frac{3}{4}$	8 $\frac{1}{2}$ a 9 $\frac{1}{4}$
Centrifugals, 93/97° test	6 a 7 $\frac{1}{4}$	8 a 8 $\frac{3}{4}$
Muscovadoes, 87/91° test	4 a 5 $\frac{3}{4}$	6 a 6 $\frac{7}{8}$
Mol. Sugars, 85/90° test	3 $\frac{3}{4}$ a 5 $\frac{1}{4}$	5 $\frac{3}{4}$ a 6 $\frac{5}{8}$

MARCH.—In presence of the large stocks accumulated in first hands, planters were compelled to submit to buyers' exigencies, and accordingly a fair business was closed at constantly declining quotations.

Extreme prices paid during the month, for all classes, were as follows:—

	1884.	1883.
March.	Rs.	Rs.
Clayed No. 12, for Spain.....	9 $\frac{3}{4}$ a 10 $\frac{1}{4}$..	10 a 10 $\frac{1}{4}$
„ „ „ United States..	5 $\frac{1}{2}$ a 6 $\frac{1}{4}$..	8 $\frac{1}{2}$ a 9 $\frac{1}{2}$
Centrifugals, 93/97° test.....	5 $\frac{1}{2}$ a 6 $\frac{3}{4}$..	8 $\frac{1}{2}$ a 9 $\frac{1}{4}$
Muscovadoes, 87/91° test.....	4 a 5 ..	6 $\frac{1}{2}$ a 7 $\frac{1}{4}$
Mol. Sugars, 85/90° test	3 $\frac{3}{4}$ a 4 $\frac{3}{4}$..	6 $\frac{3}{4}$ a 7

APRIL.—Market ruled exceedingly depressed; after holding back their stocks as long as possible, sellers brought them forward in such large a quantity as to considerably exceed the demand that ruled throughout the week exceptionally light.

Extreme prices paid during the month, for all classes, were as follows:—

	1884.	1883.
April.	Rs.	Rs.
Clayed No. 12, for Spain.....	8 $\frac{3}{4}$ a 9 $\frac{1}{2}$..	9 $\frac{3}{4}$ a 10 $\frac{1}{4}$
„ „ „ United States..	4 $\frac{1}{2}$ a 5 $\frac{1}{2}$..	8 $\frac{1}{4}$ a 9
Centrifugals, 93/97° test.....	4 $\frac{3}{4}$ a 5 $\frac{5}{8}$..	8 a 8 $\frac{3}{4}$
Muscovadoes, 87/91° test.....	3 $\frac{1}{2}$ a 4 $\frac{3}{8}$..	6 $\frac{3}{8}$ a 7 $\frac{1}{2}$
Mol. Sugars, 85/90° test	3 $\frac{1}{4}$ a 4 ..	6 $\frac{1}{4}$ a 7

MAY.—Prices during this month alternatively fluctuated upwards and downwards, and it happened more than once that sellers, believing that the long expected advance had at last been initiated, rejected offers which were no more obtainable a few hours later, in spite of the visible daily reduction in receipts.

Extreme prices paid during the month, for all classes, were as follows:—

	1884.	1883.
May.	Rs.	Rs.
Clayed No. 12, for Spain.....	8 $\frac{1}{2}$ a 9 ..	9 $\frac{3}{4}$ a 10
„ „ „ United States..	4 $\frac{1}{4}$ a 5 $\frac{1}{4}$..	8 $\frac{1}{2}$ a 9 $\frac{1}{4}$
Centrifugals, 93/97° test.....	4 $\frac{3}{8}$ a 5 $\frac{5}{8}$..	8 a 9 $\frac{1}{8}$
Muscovadoes, 87/91° test.....	3 $\frac{1}{4}$ a 4 $\frac{3}{8}$..	6 $\frac{3}{4}$ a 7 $\frac{5}{8}$
Mol. Sugars, 85/90° test	3 a 4 $\frac{1}{8}$..	6 $\frac{1}{8}$ a 7 $\frac{3}{8}$

JUNE.—Buyers and sellers being now much disheartened, and having given up all hope to retrieve their first losses, looked upon the future with indifference, and on either side there was no desire manifested during the whole month to enter into large transactions.

Extreme prices paid during the month, for all classes, were as follows:—

	June.	1884. Rs.	1883. Rs.
Clayed No. 12, for Spain.....		8 $\frac{1}{4}$ a 8 $\frac{3}{4}$..	10 a 10 $\frac{3}{4}$
" " " United States..		4 $\frac{1}{4}$ a 4 $\frac{3}{4}$..	8 $\frac{1}{2}$ a 9 $\frac{1}{4}$
Centrifugals, 93/97° test.....		4 $\frac{1}{2}$ a 5 ..	8 $\frac{1}{4}$ a 9
Muscovadoes, 87/91° test.....		3 a 3 $\frac{3}{4}$..	6 $\frac{1}{2}$ a 7 $\frac{1}{2}$
Mol. Sugars, 85/99° test.....		2 $\frac{3}{4}$ a 3 $\frac{1}{2}$..	6 $\frac{1}{4}$ a 7 $\frac{1}{4}$

JULY.—In the expectation of the decree reducing the export duties, and the establishment of several other important concessions offered by the Government, buyers and sellers withdrew from the market, which ruled exceedingly quiet with nominal prices, until the middle of the month, when favourable advices received from abroad imparted some activity to the demand and more firmness to prices, transactions remaining rather limited, on account of the wide disparity between buyers' and sellers' views.

Towards the end of said month the long expected decree, reducing export duties on sugar and molasses, was at last promulgated; duties on centrifugals and other dry classes were lowered to 40 cts. per 100 kilos, on muscovadoes, molasses sugars, melado and all such damp classes, to 35 cts. do. do., and on molasses, to 13 cts.

But this circumstance did not materially affect the market that ruled at the time much depressed, owing to adverse reports from abroad.

Extreme prices paid during the month, for all classes, were as follows:—

	July.	1884. Rs.	1883. Rs.
Clayed No. 12, for Spain.....		8 a 8 $\frac{1}{2}$..	10 $\frac{1}{2}$ a 11
" " " United States..		4 $\frac{3}{4}$ a 6 $\frac{3}{4}$..	8 $\frac{1}{2}$ a 9 $\frac{1}{4}$
Centrifugals, 93/97° test.....		4 $\frac{1}{2}$ a 6 $\frac{1}{4}$..	8 $\frac{1}{4}$ a 9
Muscovadoes, 87/91° test.....		3 $\frac{1}{4}$ a 4 $\frac{1}{2}$..	6 $\frac{1}{4}$ a 7
Mol. Sugars, 85/90° test.....		2 $\frac{1}{2}$ a 4 ..	6 a 6 $\frac{3}{4}$

AUGUST.—Owing to adverse reports throughout the month, holders were compelled to make concessions in prices which ruled rather irregular, and closed at the end, barely supported at inside quotations printed below.

Extreme prices paid during the month, for all classes, were as follows:—

	August.	1884. Rs.	1883. Rs.
Clayed No. 12, for Spain.....		7 $\frac{3}{4}$ a 8 $\frac{1}{4}$..	10 $\frac{3}{4}$ a 11
" " " United States..		5 $\frac{3}{4}$ a 6 $\frac{1}{4}$..	8 $\frac{3}{4}$ a 9 $\frac{1}{4}$
Centrifugals, 93/97° test.....		5 a 6 ..	8 $\frac{1}{4}$ a 9
Muscovadoes, 87/91° test.....		3 $\frac{1}{4}$ a 4 $\frac{1}{4}$..	6 $\frac{1}{4}$ a 6 $\frac{3}{4}$
Mol. Sugars, 85/90° test.....		2 $\frac{3}{4}$ a 4 ..	6 a 6 $\frac{1}{2}$

SEPTEMBER.—Much quietness continued to prevail, and, in presence of the reluctance of buyers to enter into any transaction of importance, prices declined further.

Extreme prices paid during the month, for all classes, were as follows:—

	1884.	1883.
September.	Rs.	Rs.
Clayed No. 12, for Spain.	7 $\frac{3}{4}$ a 8	10 $\frac{3}{4}$ a 11
" " " United States ..	4 $\frac{3}{4}$ a 6 $\frac{1}{4}$	8 $\frac{3}{4}$ a 9 $\frac{1}{4}$
Centrifugals, 93/97° test	4 $\frac{1}{2}$ a 6	8 a 9
Muscovadoes, 87/91° test	2 $\frac{3}{4}$ a 4 $\frac{1}{4}$	6 $\frac{1}{4}$ a 7
Mol. Sugars, 85/90° test	2 $\frac{1}{4}$ a 3 $\frac{1}{2}$	6 a 6 $\frac{3}{4}$

OCTOBER.—In consequence of continued demoralising advices from abroad and daily reductions in quotations in New York and London, this market ruled depressed to a further extent, and prices, in spite of holders' efforts to support them, retained their previous weak and nominal tone.

Extreme prices paid during the month, for all classes, were as follows:—

	1884.	1883.
October.	Rs.	Rs.
Clayed No. 12, for Spain	7 $\frac{3}{4}$ a 8	10 $\frac{3}{4}$ a 11
" " " United States ..	5 $\frac{1}{4}$ a 5 $\frac{3}{4}$	8 $\frac{1}{2}$ a 9 $\frac{1}{4}$
Centrifugals, 93.97° test	4 $\frac{1}{2}$ a 5 $\frac{3}{4}$	8 $\frac{1}{4}$ a 9 $\frac{1}{4}$
Muscovadoes, 87/91° test	3 a 4	6 $\frac{1}{2}$ a 7
Mol. Sugars, 85/90° test	2 $\frac{1}{2}$ a 3 $\frac{3}{4}$	6 $\frac{1}{4}$ a 6 $\frac{3}{4}$

NOVEMBER.—In harmony with the situation of the staple in all the consuming centres, the market here ruled dull and nominal, neither sellers nor buyers showing any disposition to enter into large transactions.

In the earlier part of the month under review grinding was inaugurated under the most favourable conditions of weather; but on account of the exceptional tight financial situation of planters, their inability to obtain advances, and the lack of the requisite attention to the fields in many localities, nothing definitive could as yet be said regarding the final results of the crop.

Towards the close the quietness was increased to a further extent by the expectation that the commercial treaty signed in Madrid, by Mr. Foster and Sr. Albacete, would soon be enforced in both countries and would accordingly considerably improve the situation of our sugars in the American markets.

Extreme prices paid during the month, to all classes, were as follows:—

	1884.	1883.
November.	Rs.	Rs.
Clayed No. 12, for Spain.....	8 a $8\frac{1}{4}$..	$10\frac{3}{4}$ a 11
" " " United States ..	5 a $5\frac{3}{4}$..	8 a 9
Centrifugals, 93/97° test	$4\frac{1}{2}$ a $5\frac{3}{4}$..	7 a 9
Muscovadoes, 87/91° test	$2\frac{3}{4}$ a 4 ..	$6\frac{1}{4}$ a 7
Mol. Sugars, 85/90° test	$2\frac{1}{2}$ a $3\frac{3}{4}$..	$5\frac{3}{4}$ a $6\frac{1}{2}$

DECEMBER.—No improvement whatever was noticed during the month, the market keeping dull and prices ruling weak all the time, in consequence of adverse news from abroad and the continual uncertainty that prevailed regarding the treaty.

By the end of the year stocks of new sugars had sufficiently accumulated at all our shipping ports to allow fair selections to be made in case some demand had unexpectedly sprung up; but transactions in new sugars, either on the spot or to arrive, were exceedingly small, and without materially altering prices that closed with the year strongly tending to decline further.

Extreme prices paid during the month, for all classes, were as follows:—

	1884.	1883.
December.	Rs.	Rs.
Clayed No. 12, for Spain.....	$7\frac{3}{4}$ a 8 ..	$10\frac{3}{4}$ a 11
" " " United States ..	$4\frac{1}{2}$ a $5\frac{1}{4}$..	$7\frac{3}{4}$ a $8\frac{3}{4}$
Centrifugals, 93/97° test	$4\frac{1}{2}$ a $5\frac{3}{4}$..	$6\frac{3}{4}$ a $8\frac{3}{4}$
Muscovadoes, 87/91° test	$2\frac{3}{4}$ a $3\frac{3}{4}$..	$5\frac{3}{4}$ a $6\frac{3}{4}$
Mol. Sugars, 85/90° test	$2\frac{1}{2}$ a $3\frac{1}{2}$..	$5\frac{1}{2}$ a $6\frac{1}{2}$

Extreme prices paid for all classes during the year were thus, as follows:—

	1884.	1883.
	Rs.	Rs.
Clayed No. 12, for Spain.....	$7\frac{3}{4}$ a $10\frac{1}{2}$..	$9\frac{3}{4}$ a 11
" " " United States ..	$4\frac{1}{4}$ a $6\frac{3}{4}$..	$7\frac{1}{2}$ a $9\frac{1}{2}$
Centrifugals, 93/97° test	$4\frac{3}{8}$ a $7\frac{1}{4}$..	$6\frac{3}{4}$ a $9\frac{1}{4}$
Muscovadoes, 87/91° test	$2\frac{3}{4}$ a $5\frac{3}{4}$..	$5\frac{1}{2}$ a $7\frac{3}{8}$
Mol. Sugars, 85/90° test	$2\frac{1}{4}$ a $5\frac{1}{4}$..	$5\frac{1}{4}$ a $7\frac{3}{8}$

Average prices for all classes paid in 1884, compared with those of 1883, as follows:—

	1884.	1883.
	Rs.	Rs.
Clayed No. 12, for Spain	$9\frac{1}{8}$..	$10\frac{3}{8}$
" " " United States	$5\frac{1}{2}$..	$8\frac{1}{2}$
Centrifugals, 93/97° test	$6\frac{1}{8}$..	8
Muscovadoes, 87/91° test	$4\frac{1}{4}$..	$6\frac{1}{8}$
Mol. Sugars, 85/90° test	$3\frac{3}{4}$..	$6\frac{1}{8}$

MOLASSES.

The low prices that have ruled throughout the year for this article in the United States have offered no enticement whatever to buyers, and the greater part of shipments was effected for account of dealers, who succeeded in few cases only to recover their money.

Extreme prices paid during the year have been as follows:—

	1884.	1883.
For parcels on the spot, per brl. of $5\frac{1}{2}$ gallons.....	Rs. $1\frac{1}{2}$ a $3\frac{3}{4}$..	$3\frac{1}{2}$ a $6\frac{3}{4}$
For future deliveries, per hhd. of 175 gallons	\$ 7 a 14 ..	18 a 23

Exports from this port were as follows:—

	1884.	1883.
	Hhds.	Hhds. *
To the United States	17,231	9,461
To Spain	180	18
To other parts	18	200
Total.....	17,429	9,799

RUM.

The low prices that have ruled throughout the year for molasses have allowed distillers to increase their production and gradually reduce prices until reaching the unprecedented figures that we quote hereafter. The extreme prices obtained in 1884, as compared with those paid in 1883, were the following:—

	1884.	1883.
21 proof in chestnut casks Pipe	\$20 a 33	\$32 a 31
„ in oak casks	25 a 42	37 a 42
30 grades in oak casks.....	36 a 55	47 a 55

Exportation through this port in 1884 amounted to 16,825 pipes, against 7,391 in 1883, that were respectively distributed as follows:—

	1884.	1883.
	Pipes.	Pipes.
Great Britain	500	—
France	—	10
Spain.....	11,159	2,691
South of Europe	1,169	2,492
South America	3,997	2,198
Total.....	16,825	7,391

Havana Weekley Report.

For the table of exports of sugar from Cuba for 1884, see *August Sugar Cane*, page 443.

TRIAL OF CANE-CRUSHING MACHINES IN INDIA.

From the *Indian Agriculturist*.

From E. C. OZANNE, Esq., Director of Agriculture, Bombay, to J. NUGENT, Esq., Secretary to Government, Revenue Department, Bombay, dated Camp Gadag, District Dharwar, 8th January, 1885.

SIR,—As desired in Government Resolution No. 3067, dated 15th April, 1884, I have the honour to report that I have carried out experimental trials of several cane-crushing machines. I have not yet had an opportunity of testing the machines of the Bhadgaon Farm to which Mr. Robertson drew attention, but a copy of this report will be sent to Mr. Stormont, who will be able to compare his results with those now recorded.

2. I have experimented with the following:—

1.—The ordinary 2-roller wooden mill of the country.

2.—An improved 3-roller cast-iron mill with iron frame, invented by Mr. Subrao Raoji Chowhan, owner of a cast-iron foundry in Adivar Peth, Poona.

3.—The single-squeeze Bihia mill, patented by Messrs. Thompson & Mylne, with two rollers, 8in. by 10in.

4.—The double-squeeze Bihia mill, with two rollers, 7in. by 8in., and one break roll 4½in. by 8in.

3. The Bihia mills were sent to the Poona Show by the Bombay agents, Messrs. Ewart, Latham & Co., and were accompanied by trained hands from Bihia. The prices of the mills were given by these men at Rs. 165 and 171 respectively, but the prices quoted in the catalogue of the Madras agents, for mills answering the descriptions given, are quoted at Rs. 150 and Rs. 160 respectively. It may be that those I tried were provided with steel pinions, but a reference will be required to clear up the points of difference in quoted prices.

The Bihia mill was tried by Mr. Stormont at Bhadgaon. He reported very unfavourably on it. I believe that the firm have improved on their old pattern, for the results about to be exhibited are decidedly favourable.

The Poona mill, Subrao's 3-roller mill, has an iron frame, whereas the Bihia mills have a wooden one. The rollers of the latter are slightly grooved. Those of the Poona mill are quite smooth. This

latter mill has for some time attracted attention. It is extensively used. It is most undoubtedly vastly superior to the wooden *charak*, and has to a great extent superseded it in the close vicinity of Poona, where the makers are at hand to repair the iron mill.

4. The first trial was made during the Poona Show.

Two mills were worked, viz., Subrao's and the Bihia 2-roller.

For the former, two pairs of ordinary bullocks, with a driver for each pair, are required. Two men feed the machine, one inserts the cane between two of the rollers, the other receives the half-pressed cane and pushes it back between the middle and third roller. The mill is placed on the ground, and to receive the expressed juice a hole is dug in the ground, into which a large iron or earthenware receiver is placed. This is covered over with boards, and one of the feeders sits on the boards. The cane is cut into lengths of about two-and-a-half to three feet, and the cut is made in a slanting direction so as to leave a pointed end for insertion between the rollers. It took a man 15 minutes to prepare 500 lbs. of cane, already topped and stripped. This cutting is quite unnecessary for the Bihia mill.

For the latter, only two oxen are used, working singly at the ends of levers, by which motion to the machine is imparted. Two drivers are required, but only one feeder. As there is a contrivance for holding the cane inserted the feeder has ample time to clear away the squeezed cane himself. The machine bites the cane, and holds it so that there is no necessity for its being cut into short lengths. In the trial the workers of Subrao's mill kept the bullocks at a pace which they could not have maintained for half a day, the usual time for one set of animals to work. This haste was quite uncalled for. The man in charge of the Bihia mill worked very steadily and deliberately.

RESULTS.

	Subrao's Mill.	Bihia Mill.
Time occupied to squeeze 500 lbs. of topped and stripped cane.. . . .	63 min.	65 min.
Weight of juice extracted	342 lbs.	308 lbs.
Percentage of juice to cane	68.4	61.6
Number of oxen employed	4	2
Number of men employed	5	3

It must be noticed also that the juice is received from the Bihia mill in pots placed on the ground easily removable. The time occupied in lifting out the juice from the buried receptacle in the

Poona mill is considerable. Fully two men more are required by this latter mill.

This result was considered unsatisfactory by the man in charge of the Bihia mill, and as considerable interest was excited by the trial it was decided to repeat it. An inamdar offered the use of his land and cane, and to provide labour.

The second trial was made after the bustle of the Show was over. Four mills were used :—

- 1.—The wooden country mill, worked by two pairs of oxen with drivers, two feeders and one helper. The cane has to be cut into short lengths. A large hole is dug, large enough to admit the two feeders. The bullocks assigned to this mill were the best on the ground. The pairs assigned to the Poona iron mill came next in quality. Those given to the Bihia mills were certainly inferior, but they were quite good enough.
- 2.—Subrao's mill.
- 3.—Bihia single-squeeze mill.
- 4.—Bihia double-squeeze mill.

This last only requires one bullock, one man to drive, and one feeder. In other respects it has the same advantages as the single-squeeze mill above described.

The trial was made very carefully under ample supervision, for I was assisted by an European and a native gentleman to watch each mill, and to weigh and distribute the cane, and finally to weigh the expressed juice.

500lbs. of cane, topped and stripped and cut into lengths for the two first-named mills, were distributed.

RESULTS.

	No. 1.	No. 2.	No. 3.	No. 4.
Time	67 min. ..	48 min. ..	69 min. ..	103 min.
Weight of juice	308 lbs. ..	337 lbs. ..	346½ lbs. ..	353½ lbs.
Percentage of juice to cane	61·6 ..	67·4 ..	69·3 ..	70·7
Number of oxen.....	4 ..	4 ..	2 ..	1
„ of men	5 ..	5 ..	3 ..	2

The pace at which the cattle worked was tested, with the following result :—

Number 1.....	3 $\frac{1}{4}$	rounds per minute.
Do. 2.....	3	do. do.
Do. 3.....	2 $\frac{3}{4}$	do. do.
Do. 4.....	2 $\frac{1}{4}$	do. do.

I had no dynamometer, and resorted to a rough method of comparing the power expended on each mill. I found that the ordinary labourer pulled about 60lbs., measured by a spring balance. The following numbers of men were needed to turn each machine:—

Number 1	7	men representing	420 lbs.
Do. 2.....	5	do. do.	300 ,,
Do. 3.....	2 $\frac{1}{2}$	do. do.	150 ,,
Do. 4.....	1 $\frac{1}{4}$	do. do.	75 ,,

I must note that owing to haste and hurry on the part of the feeders of No. 2 mill (Subrao's) some juice was spilled in changing the pots. On the whole, I thought, that as regards out-turn of juice, Nos. 2 and 3 were about equal.

Mr. Subrao claimed another trial on the ground that his mill could do better work than this. Another field had to be chosen. Here the cane was seventeen months old (that of the principal trial was only one year old). I succeeded in having No. 4 Bihia mill (3-roller) brought to the spot, but the expert had gone. It was fed by a new hand. The results were:—

	Time.	Juice.	Percentage.
Subrao's Mill	60 min. ..	365 $\frac{1}{2}$..	73.1
Bihia 3-roller	130 min. ..	322 ..	64.4

In this trial I weighed the refuse cane, which was found to be 138lbs. and 165lbs. respectively.

In the case of the Poona mill 365 $\frac{1}{2}$ lbs. juice and 138lbs. refuse = 503 $\frac{1}{2}$ lbs. The small discrepancy was due to not very accurate scales. In the case of the other mill, 322lbs. juice and 165lbs. megass = 487lbs. Here the discrepancy was too high. I cannot be sure that some of the cane or juice was dishonestly abstracted, but I cannot consider this trial to have been a fair one to the Bihia mill. The feeder was unaccustomed to it. I cannot be certain that it was set properly. However, the result was favourable to the Poona mill.

To sum up—The Bihia mills, as regards portability, cost of setting up, and cost of working, possesses very great advantages over the Poona mill. It is cheaper, though, as noted above, the prices are not exactly known.

As regards construction, the trial could not prove much.

In point of mechanism, the Bihia mill shows best.

The efficiency of the Bihia mill is as great as, if not greater than that of the Poona mill. Mr. Subrao deserves very great credit for his improvement. He admits that at first his rollers showed a tendency to break, but claims that they do not now. The wooden *charack* is a thing of the past where sugar cane growers have the power to purchase either of the improved mills or facilities for hiring. This latter is the almost universal practice near Poona.

It is open to Messrs. Thompson & Mylne to introduce their mills into Poona, and I would throw out a hint that they would benefit by making Mr. Subrao their agent, and, if his foundry is good enough, their local manufacturer. The firm of Richardson & Cruddas, in Bombay, now makes the rollers and iron work. This is their affair, not mine. I do not know how far Mr. Subrao would approve of the idea. Mr. Subrao charges Rs. 200 for his mill, but hires it for Rs. 1 a day, bearing all risks. The wooden country mill costs Rs. 35 to Rs. 40, lasts about two years, and is hired for 12 as. a day.

GERMAN TRADE RETURNS.

The German trade returns for the first half of the current year show a contraction of the exports of each important article. In the spring many complaints were made that the foreign middlemen and buyers were restricting their purchases (especially of textile fabrics) within very narrow limits, and the statistics have confirmed these complaints. The worst feature of the returns, from the German point of view, is the fact that the export figures show a much less satisfactory relation to the import figures than hitherto. The exports of silk and partly silk goods show a decrease of 357 tons, and the imports an increase of 74 tons. The exports of woollen yarn show a decrease of 133 tons, and the imports an increase of 774 tons. Linen and jute fabrics show a decrease of 37 tons in the exports, and an increase of 73 tons in the imports. The exports of cotton fabrics decreased 545 tons, and imports 1 ton. Linen and jute yarns and twist show an increase of 77 tons in the exports, but against this there was an increase of 1,627 tons in the imports. The imports of cotton yarn decreased 925 tons, while the exports increased 43 tons. The movements of the raw materials for the textile industries—cotton, wool, flax, and hemp—decreased both ways.

SUGAR TARIFF PROBLEMS AND UNITED STATES HOME INDUSTRIES.

Letter from Mr. H. A. BROWN.

In view of the inevitable approach of a triangular tariff struggle in Congress, it is wise to consider the gravity of our commercial and industrial situation, lest we plunge roughshod into the great international race for trade supremacy, pitted as we are against countries whose chief trade advantages over us consist in their ability to employ labour for what would prove starvation prices or worse in this country, and quickly lead to revolution.

In the fiscal year ended June 30, 1884, the total duties levied on imported merchandise consumed in this country was \$3.41 (three dollars and forty-one cents) per capita. The total amount of foreign merchandise consumed was \$667,575,389, or \$12.01 per capita; average duty thereon, 28 $\frac{4}{10}$ per cent. This does not indicate burdensome taxation on imported merchandise consumed by the well-to-do people of this country.

Two conclusions are inevitable, even if all other conditions were equal: American producers and manufacturers cannot profitably compete with the cheaper labour of Europe* and the semi-starvation prices paid in most foreign countries, and it would be idiotic to horizontally reduce duties on all manufactured imports; it would then become impossible to compete at home with foreign labour, much less in foreign markets.

These conditions follow us in negotiating reciprocity treaties with other countries, with the single exception of Canada, where the cost of labour approximates the prices paid in the United States. Treaties of the Hawaiian type will inevitably subject this country to increase of imports and loss of revenue, without a corresponding increase of sales of American merchandise, because we cannot prevent England and other European countries from flooding sugar-producing countries with cheaper merchandise than we can produce.

The United States have abundant normal capacity for profitably producing all the sugar required for home consumption. That we

* We would refer our readers to a well written letter, dated Fall River, August 4th, addressed to the *Manchester Guardian* on this subject of wages in the United States as compared with the prices paid in this country. See page 483.

have not already done so under a high sugar tariff only proves that, as a nation, we have never earnestly set about producing sugars.* This is evidenced in the diversion of capital to enterprises, whereby other industrial and mineral resources, and the great railway system of this country, have been rapidly developed.

With legislation wisely adjusted, enough beet sugar can be profitably produced in California, Oregon, and Washington territory alone to fully supply our consumption, while Louisiana, Texas, and Florida can profitably produce a million of tons of cane sugar per annum as readily as they now produce a moiety; and sorghum sugar and syrup can be profitably produced in the United States in quantities limited only by the demand of consumers.

Wherever adequate brains, capital, energy, improved machinery, and skill have been persistently applied to sugar production in this country, profitable results have been obtained. Without the aid of the aforesaid adjuncts failure is inevitable. To offset our high-priced labour, our raw sugar material can and must be made to yield 80 per cent. of juice and 10 per cent. of sugar, instead of the 40 to 60 per cent. of juice and 5 or 6 per cent. of sugar obtained by the old process of sugar-making.

One large central factory, thoroughly equipped, can produce far more and better sugar at less aggregate cost than twenty or more small sugar houses can obtain from the same quantity of raw material. It is possible in this country to double the average sugar product from raw material, and reduce the cost of producing sugar *pro rata*. This has readily been done in Europe and in California.

Many Louisiana planters have profitably produced 3000lbs. of sugar per acre of cane. With diffusion and improved machinery they, and all other planters, can obtain a much greater yield of sugar. The small beet sugar factory in California, under able management, profitably produced 3000lbs. of *refined* sugar per acre of beets in the crop year 1884-5, obtained 10 per cent. of *refined* sugar per ton of beets worked, and made 2,500,000lbs. *refined* sugar (1116 tons).

Sorghum seed pays the cost of raising sorghum; thus sugar and syrup can be produced from sorghum at the bare cost of working the

* We suspect that the reason why sugar growing is not vigorously taken up by capitalists is, that it is not "good enough." Americans with long heads and long purses are not to be caught by the glowing statements of sugar enthusiasts; they see that works which were to do such wonderful things one year, are "winding-up" the next.—Ed. S. C.

cane and juice. Although sugar cane and beet juices greatly excel in crystallizing qualities, excellent sorghum sugar is being made in many States, as a hundred samples before me attest.

The actual consumption of imported sugars in the United States increased from 1,575,893,944lbs. in 1875, less 24,152,148lbs. exported, to 2,562,719,593lbs. in 1884, less 76,122,813lbs. exported; or from 25.31lbs. per capita in 1875, to 44.76lbs. per capita in 1884. With this enormous demand for sugar food in excess of what we produce, and having a normal capacity of sugar production adequate to supply our entire consumption, we have, without good cause, circumscribed this boundless source of national industry and wealth.

Congress will find it no boy's play to guard the interests of sixty millions of consumers of sugar food; protect our sugar-refining industries, without which consumers would be at the mercy of foreign producers, and beyond question foster our sugar-producing industries, in the face of European production, cheap foreign labour, increasing consumption, and an imperative home demand for cheap sugars.

Neither heavy duties, nor general "free trade," nor desertion of our sugar-producing industries, nor one-sided treaties with foreign countries, are at all desirable or requisite for the correct legislative solution of this momentous sugar question, which I of course but gently touch at present on topics named in this connection.

HENRY A. BROWN.

Saxtonville, Mass., August, 1885.

INVENTIONS EXHIBITION.

A Silver Medal has been awarded Messrs. Ed: Paskard & Co., of Ipswich, in Group 14, for the improvements in the manufacture of phosphoric acid and superphosphates and the manufacture of cane juice. (See August *Sugar Cane*, page 433.)

ANTWERP INTERNATIONAL EXHIBITION.

We are informed that The Anglo-Continental (late Ohlendorff's) Guano Works of London, Hamburg, Antwerp, Emmerich, &c., have been awarded two Diplomes d'honneur at this exhibition for the excellence of their dissolved Peruvian guano and chemical manures, as well as for their important direct importations. The Diplome d'honneur is the highest possible award, so the double event is quite an exceptional distinction.

THE PROTECTED INDUSTRIES OF THE UNITED STATES.

The following account, which has been furnished to the *Manchester Guardian* by a correspondent, is a valuable contribution to the discussion which is now being carried on as to the causes of the present, almost universal, depression in trade. We see from this report that in the United States, where protection has had its full fling, that the state of trade in the manufacturing districts, is even worse than it is in Great Britain. It is a stock argument with the United States protectionists, that their workpeople cannot exist upon the "half starvation" wages paid in Lancashire; and hence the necessity for protection. Yet, from this account, it would appear that whilst the women earn rather more than with us, the wages of the men are only about the same. On the other hand, rents in the United States are put down at 16s. to 20s. per week, against our 6s. to 9s.; and in the matter of clothing, the cost is double what it is with us, and that for an inferior article. We would commend to the attention of our protectionist readers in the States, the facts here set forth.—ED. S. C.

Fall River, Massachusetts, August 4.

The fabric-producing industries—in fact, most of the industries—of this country are still dull and unprofitable, and that, too, despite the high protective duties religiously maintained to keep them active and brisk. This has been their condition for the past four years, and appearances indicate that matters are perpetually drifting from bad to worse. To those who have eyes to see and will see it is evident that Protection has seen its best days, and that it is now "putting in its besticks" in working adversity.

I have just been on a tour of inspection among the industries of Philadelphia, the largest manufacturing centre in this country, where there is little else but discontent; and I come on to Fall River, the great city of spindles, to find even greater discontent and poverty. In this city the great staple product is print cloths. The trade here is at present in a more depressed condition than it was ever known to be in the history of print cloth manufacture. There is no telling when the market will improve. All the mills are joint-stock concerns, and stockholders mourn the absence of dividends and the steady decline of the value of their

stock. The operatives, who have been toiling through the heated summer at barely living wages, find little hope of an improvement in their condition.

Brokers and manufacturers agree on one point—that the market is in a bad shape. Some favour short time and others oppose it. The mills during the summer have been run and closed alternate weeks, with a reduction in wages. The opponents of a further curtailment of production argue that the stock of goods on hand in Fall River is not extraordinarily large—only about 400,000 pieces,—and of this two-thirds is held by five corporations, leaving the greater number of mills with only about a week's product on hand. What the manufacturers here are afraid of is that the big stock held in Providence, in the adjoining State of Rhode Island, would be unloaded upon the market in case of a rise. The opponents of curtailment argue that to stop now would only benefit the Rhode Island manufacturers and speculators, who would be prepared to reap the benefit of an advance in price, while the bulk of Fall River mills, not having goods of any amount on hand, would be unable to reap any immediate benefit.

Another fact which adds to the complication of the present situation is the strange willingness to sell goods at three halfpence per yard—or less than one-half the price at which manufacturers hitherto have professed to be working at a ruinous loss,—and even contract for future deliveries at that price.

An effort has been and is being made to create a popular sentiment in favour of wearing print cloths instead of woollens, silks, satins, &c., with a view to improve the cotton trade. Meanwhile, there is no unity of action among the manufacturers; the mills stop a week and then run a week, the wages have been cut down to the lowest point, and the operatives are helpless to get away to other spheres if they were willing.

Thus matters have been going on since 1878, in which year the mills were stopped for eight weeks and wages were cut down 15 per cent. Other and larger reductions have taken place since then, and yet the cotton trade is in a worse state than ever. Protection has done its work effectually here. It has built up a wall around the cotton industry, and all the products of the industry must be consumed within the enclosure, for Protection, by raising fictitious prices,

has killed the chances of the producers competing in the markets outside their own borders.

In Philadelphia there is an army of 250,000 at work turning raw materials into manufactured products. The capitalists who are engaged in these industries receive all the wages paid by them from the public in the form of gratuities, known as Customs duties. The carpet manufacturer receives a bounty of 50 per cent. If he were obliged to sell his product in competition with the English manufacturer its apparent value might be a third less, or about \$9,500,000, so that about \$4,700,000 is given him to meet a pay-roll of a little more than \$3,000,000.

Of course, it is not fair to say that all the bounty is expended for labour, although the protected manufacturers say that they need the tariff tax for the purpose of compensating them for the difference in the cost of labour between this country and Europe. The tariff law imposes duties, however, on the manufacturer, for he is a consumer of raw material. The carpet makers, for instance, pay a duty on wool and on machinery, for it is a noteworthy fact that a good deal of the best machinery used in the largest of the Philadelphia carpet mills is made in and imported from England. The tax levied on imported goods is imposed professedly to pay the manufacturer here the difference between the prices of labour here and abroad.

The Government has, however, given them much more than their demand. The carpet manufacturer receives a protection of 29 per cent. more than the cost of all his labour. The maker of men's woollen clothing receives, in addition to all his labour, 38 per cent.; of cotton clothing, 13 per cent.; of women's clothing—woollen, 40 per cent.; cotton, 15 per cent. The dyers are given 17 per cent. more than they pay for labour. The manufacturers of woollen hosiery and knitted goods receive 31 per cent. more than they pay for labour, the woollen manufacturers 48 per cent., the cotton manufacturers 16 to 28 per cent., and the worsted manufacturers 33 per cent.

It is evident that under the present tariff the men engaged in carrying on these industries ought not to talk about "the pauper labour of Europe," but they do. The cost of labour hardly enters into the calculation of the cost of production. The Government apparently supplies all the wages that are paid in the great woollen and cotton mills. And yet something is standing in the way of the prosperity of

many of the manufacturers not only of Philadelphia, but of the whole country. What Protection means for the working men, it would be interesting to find out. They earn very little under the present system, but they have been induced to believe that they cannot earn anything unless their employers are protected as they now are, and that everyone who advocates freer exchange between this and other countries is an enemy of American labour.

The depression in business is not confined to the production of fabrics. It affects the shipbuilding and other interests. The depression has sent adrift from one shipbuilding establishment 800 men out of work. This is the summer story of two-thirds of the best-paid mechanics of this protected country. With a protection of 50 per cent. the builders of ships cannot sell their vessels, and the whole of the ocean shipping is in the hands of Free-trade England. The condition of the skilled labourers in the carpet and worsted mills is very marked. A loom fixer (overlooker) writes :—" You ask the condition of the working people of our trade. To be brief, I can only say impoverished. . . . The wages of the working man are being continually cut, year after year, until he is hardly able to procure the necessaries of life." The ingrain weavers in the carpet trade have recently been on strike for an advance of 15 per cent., and they got 9. The reduction of wages in carpet mills during the past eleven years has been very great.

Discontent is not confined to the carpet weavers. It runs through the ironworkers, the cotton spinners, the dyers, the worsted weavers. While the employers say that they oppose the reduction of rates of duty because they are not willing to see the "pauper labour" of Great Britain domesticated in the United States, the working men tell you that they are already impoverished. The hundreds of men who work at the furnaces and in the founderies, at the hammers and in the rolling mills, get very small wages. Yet Philadelphia is an exceptionally attractive home of American working men, for while its working people are dissatisfied they are better off than most of their brethren elsewhere. Their tale is not wholly one of misery, and yet the dyers, who receive 6s. 11½d. a day for doing what their fellows in Lowell, Mass., receive 4s. 9½d. for, have recently struck for 8s. 4d. They say they cannot live on less. The working men of Philadelphia have just enough to live on ; the wages they receive appear to be little more than those received by

operatives doing the same kind of work in England. The women employed in the mills are better paid than those in the old country, but the wages of the men are about the same in both countries, while rents in the north of England are from 24s. to 36s.—and that is putting the figure high—a month in the factory towns; in Philadelphia they are from 64s. to 80s. a month. Then, while clothes are cheap in Philadelphia as compared with some other sections of the country, they cost about twice as much as in England, and then are not so good as English clothes.

If this is the result of Protection, Protection has much to answer for, and Protection is to be arraigned in the coming session of Congress and in the country in a way it was never arraigned before. The forces on either side are preparing for a struggle. What the policy of the Administration on the question of tariff reform is has not been made clear. It is, however, expected that Secretary Manning, in his coming report to Congress, will advocate the abolition of the greater part, if not the whole, of the *ad valorem* duties and the total removal or a great reduction of the duties on raw material and material in a half-manufactured state. If this is done it is certain to receive the endorsement of the President, and thus whatever influence the Administration may have will be thrown in favour of this plan of tariff reform.

That a hard-fought contest is to take place on the tariff question is apparent from the exertions the Protectionists are making in preparing their means of defence. The American Protective Tariff League has just been organised, with 20 managers, representing the leading protected industries in New York, New Jersey, Pennsylvania, Connecticut, Massachusetts, Rhode Island, New Hampshire, and Ohio. With hardly an exception all these managers are men of great wealth and political influence. The object of the League is to unite in one organisation the different protected interests, which have hitherto fought their battle on their own account, and to present in this way a solid wall of resistance to the possible advance of the tariff reformers. Both sides now may fight, and the outcome will be that the working men and voters of the country will get a more intelligent idea of the question, and then—good-bye to Protection.

NORTH BRAZILIAN SUGAR FACTORIES (LIMITED).

An extraordinary meeting of the shareholders of the North Brazilian Sugar Factories (Limited) was held on Thursday, July 30, at the City Terminus Hotel.

Mr. William Morice, who presided, said he thought that the directors might reasonably congratulate them on the very improved position of the company's affairs since they met a few months ago. The directors had made up their minds now to undertake, on their own account, the conclusion of the works which the company had in hand—that was to say, by means of their own agents. They had made various contracts for machinery and for the tramway, which they had to construct in order to put their factories into communication with the different cane-fields in the neighbourhood of the factories. The directors, in view of the change which the company had made with regard to the construction of the works and the cancelling of the contract which had been made between the company and Messrs. Reed, Bowen, and Company, had asked him (the chairman) to go to Brazil again, with the object of making certain arrangements in Pernambuco, and then of proceeding to Rio Janeiro to inform the Government of the steps they had taken in connection with the present position of the company, and to make arrangements as to the five factories on which they had not yet commenced work. He would leave for Brazil in a few days.

In reply to Colonel Rich, the chairman added that the amount of £26,056 credited to the contractors on a final adjustment of accounts was a set-off of accounts. The committee of consultation had stated in a letter that they could not agree to the settlement of this item—set down at first at £32,000 odd—for an amount higher than £28,500. The amount, however, had been reduced to £26,000. He could not say that they had materials to represent that sum. The balance of the account showed that Messrs. Reed, Bowen, and Company were still considerably indebted to the company—to the amount of £7,623. He concluded by moving the adoption of the report, “and that the meeting approve of the steps taken by the directors with reference to the application of the additional guarantee obtained from the Brazilian Government, as stated in the directors' circular of the 21st May.”

Mr. R. Bidulph Martin, M.P., seconded the motion.

Colonel Rich moved an amendment, to the effect that the report should be received, but not adopted. They were, he said, far from being out of their difficulties, and he did not feel inclined to agree to the accounts. He objected to the separate payments to Mr. Morice, holding that they ought to form part of the amount paid to the directors. In addition to the £120,000 paid for the concessions, £200,000 of the shareholders' money had been spent, and he had endeavoured to find out what they had obtained for all this capital. He did not believe that any director was aware of what the company had got.

The chairman stated that an amount of £4,000 odd appeared in the accounts as owing to the directors for remuneration. They had not received sixpence for their services for the past eighteen months or two years. They had no intention of claiming this amount until the position of the company justified it. They had subscribed £30,000 among themselves to the debentures.

Baron Grant regretted the remarks of Colonel Rich, believing they would not be to the interest of the company. The position of the company had very greatly improved since December, when they had neither funds nor credit. Their works at that time had been stopped, they were in litigation, and the jaws of liquidation were opened to swallow them up.

After some further discussion, in the course of which Mr. Martin, M.P., admitted that the directors had made mistakes, but, referring to the remarks of Colonel Rich, they had at least spent their own money as well as that of the shareholders. Baron Grant stated that he had consulted with the directors, who were quite ready to allow the £1,500 due to Mr. Morice to be deducted from the £3,000 put down in the accounts to the credit of their fees. The amendment was then put and lost, and the original motion was afterwards declared carried with one dissentient. Resolutions were next passed approving the termination of the contract with Messrs. Reed, Bowen, and Company, and thanking Baron Grant and Mr. Crisp (the solicitor) for their services.

ELECTRIC SUGAR REFINING CO.

Synopsis of the report made by Mr. Wm. S. Leviness on the weights of the sugar treated at the demonstration of the process on the 14th July, and of the analysis of the raw sugar used.

1. He certifies the purchase of the sugar as—six tons Jamaica sugar from Messrs. Wanzer, Tobias & Co., on the 3rd June, which he had put into bags of about 100lbs. each for the convenience of handling. The description is known as Muscovado.

2. On the 9th July, 1885, he accompanied Mr. H. J. Abbot, United States Government Appraiser of Sugars for the Port of New York, and examined 120 of the said sugars, while Abbot took therefrom a fair average sample for analysis.

3. The sample analysed as follows:—

Cane sugar	88·70
Invert sugar	3·30
Soluble ash	0·55
Insoluble ash	0·30
Organic matter	1·45
Water	5·70

100·00

4. On the 13th July he took 84 bags of the 120, and delivered them at the house of Professor H. C. Friend. Prior to their being removed from store they were weighed by a sworn weigher in lots of 10 each, and their total weight was 8030lbs.

5. That after the demonstration he attended at the house of the said Friend and weighed the contents of 40 barrels of refined sugar, which stood in his dining-room, and found that the aggregate net weight of the same was 6565lbs.

6. That at the same time he weighed the bags of raw sugar which had not been used, and also the empty bags, the contents of which had been refined, and he found the aggregate weight of all to be 880lbs.

From the foregoing statement it will be observed that the weight of the raw sugar taken to Friend's house was .. 8030lbs. From which deduct the amount left in bags and the weight of the empty bags

Leaves as the amount treated 7150lbs.
The weight of the refined returned was 6565 ,,

Consequently the loss was 595lbs.
Or a small fraction more than the amount of the saccharine matter which, per analysis, was shown to be in the raw sugar. The analysis shows—cane sugar 88·70 per cent. and invert sugar 3·30 per cent., or in all 92 per cent. saccharine matter.

JAMES U. ROBERTSON.

5, Baltic Buildings, Liverpool, 4th August, 1885.

NOTES ON BOOKS.

REVUE UNIVERSELLE DES PROGRÈS DE LA FABRICATION DU SUCRE POUR L'ANNÉE 1883-1884. Par François Sachs. E. Gyot, Bruxelles, 1885.

The fourth and last part of this very useful work has just appeared. We have already given a summary of the objects and contents of this interesting publication. The principal feature of this concluding part is a summary statement, chiefly statistical, of the state of the Sugar Industry in various countries. We need only add that this part seems to have been equally carefully edited with the preceding ones. All those interested in the details of the sugar industry, more especially beetroot sugar, should consult this work. A new preface and table contents are supplied with this present part, and the whole is now ready for binding.

DEPARTMENT OF AGRICULTURE. CHEMICAL DIVISION. BULLETIN No. 5. THE SUGAR INDUSTRY OF THE UNITED STATES. CANE SUGAR, BEET SUGAR, SORGHUM, AND MAPLE SUGAR. By Henry W. Wiley, Washington, 1885.

We have had occasion aforetime to speak of the completeness of these official reports. They are very valuable, for they deal with facts, showing *what has been done*, rather than with statements, made with a view to show what is going to be done.

This volume of Mr. Wiley appears very opportunely at the present time; from it we learn that the production of home-grown sugars for the year ending June 30th, 1884, was as follows:—

Cane Sugar—Louisiana	287,712,230 pounds or 128,443 tons,	
„ „ —other states estimated ..	14,000,000 „ „	6,250 „
Sorghum Sugar	726,711 „ „	324 „
Maple Sugar estimated	36,576,061 „ „	16,328 „
Beet Sugar.. .. .	1,277,876 „ „	571 „
	<u>340,292,878</u>	<u>151,916 „</u>

The yield of cane sugar is obtained, by adding to the product of Louisiana, taken from Bouchereau's report for 1884, the estimated yield of the other Southern states.

The beet sugar was all made at Alvarado (California)—the only beet factory at present existing in the United States.

The sugar statistics, for the United States, which we give each month in the *Sugar Cane*, do not include the home production, nor the sugars distributed from San Francisco.

The following statement, taken from Mr. Wiley's report, shows the importations and deliveries of raw sugar for consumption at San Francisco, for the three years ending December 31st, 1884, 1883, and 1882:—

SAN FRANCISCO SUGAR STATISTICS FOR 1884, 1883, AND 1882.

RECEIVED FROM	1884.		1883.		1882.	
	Pounds.	Tons.	Pounds.	Tons.	Pounds.	Tons.
Sandwich Islands	128,859,965	57,527	103,842,000	46,358	97,920,670	43,714
Manilla	21,392,564	9,550	20,598,562	9,195	1,528,156	682
China	1,197,104	534	4,157,392	1,856	940,946	420
Central America.....	1,725,862	770	1,932,296	863	1,670,437	746
Peru .....	....	....	600	....	....	....
Mexico	8,115	4	43,417	19	....	....
Domestic Beet Sugar	1,650,000	737	1,200,000	536	1,000,000	446
Total	154,833,610	69,122	131,774,267	58,827	103,060,209	46,008
Stock, January 1st	11,524,934	5,145	4,792,416	2,139	19,218,562	8,580
Total Supply	166,358,544	74,267	136,566,683	60,966	122,278,771	54,588
Exports—Raw & Refined	2,434,018	1,086	3,736,935	1,668	4,134,936	1,846
	163,924,526	73,181	132,829,748	59,298	118,143,885	52,742
Stock, December 31st.....	1,779,391	794	11,534,234	5,145	4,792,416	2,139
Consumption	162,145,135	72,387	121,304,814	54,153	113,351,419	50,603

The consumption of raw sugar for the whole of the United States for the years 1884 and 1883 stands as under :—

	1884. Tons.		1883. Tons.
Cane sugar consumed in the United States on the Atlantic	1,116,847	....	1,051,015
In the Pacific Coast States	72,386	....	54,154
Of sugar made from molasses	50,000	....	40,722
Of maple sugar	25,000	....	18,500
Of domestic beetroot, sorghum, &c..	1,050	....	....
	<u>1,265,283</u>		<u>1,164,391</u>
Increase over preceding year ..	100,892		86,442

If we take the relative proportions imported from each country in 1884, they would appear to be as under:—Cuba and Porto Rico 45·87 per cent. ; 15 per cent. from the other West India Islands, 12·69 per cent. from Brazil, 8·44 per cent. from the Philippine Islands, $\frac{1}{2}$ per cent. from the other East Indies, 5·33 per cent. from the Hawaiian Islands, and 7·52 per cent. was European beetroot, domestic production (cane) was 10·92 per cent.

In 1880 the imports of beet sugar into the United States were only about 2250 tons; in 1881 they were doubled, and in 1882 the quantity was over 7000 tons. In 1883 the imports of beetroot suddenly increased to about 46,000 tons, and in 1884 they reached a total of 85,000 tons.

Mr. Wiley makes special allusion to the large exports of refined sugar in 1884, which amounted to 63,643 tons, and adds "This has been possible solely in consequence of the drawback allowed to exporters, under the present tariff law, which is tantamount to a bounty, and has given our refined product an advantage, which it could not have obtained otherwise in a country where sugar is admitted free of duty."

The exports of raw sugar have been chiefly transshipments to Canada in bond, and the exports of refined from San Francisco have been absorbed by British Columbia.

The following table, giving the yearly consumption from 1867 to 1884, is exceedingly valuable, as showing the enormous increase in the consumption during this period—per head it is nearly double—and if we take the total amount consumed in 1884 as compared with 1867, nearly treble.

The statistics contained in this report form, however, but a very small part of it. It describes and comments upon the different methods employed in the United States, and in all parts of the world, in the cultivation and manufacture of sugar.

Table showing the population of the United States, the total consumption of Sugar, and amount per capita, from 1867 to 1884 inclusive.

Year.	Population.	Total Sugar consumed.*	Sugar consumption per capita.
		Tons.†	Pounds.
1867	‡36,211,000	467,268	28·9
1868	‡36,973,000	543,033	32·9
1869	‡37,756,000	574,399	34·0
1870	§38,558,371	606,492	35·3
1871	‡39,505,000	702,314	39·9
1872	‡40,500,000	720,873	39·9
1873	‡41,642,000	740,525	39·9
1874	‡42,630,000	801,015	42·1
1875	‡43,766,000	773,002	39·5
1876	‡45,050,000	745,269	37·1
1877	‡46,182,000	745,250	36·2
1878	‡47,420,000	773,472	36·0
1879	‡48,746,000	831,896	38·3
1880	§50,155,783	922,109	41·2
1881	‡51,462,000	1,008,932	43·9
1882	‡52,799,000	1,077,949	45·7
1883	‡54,163,000	1,164,391	48·2
1884	‡55,554,000	1,265,087	51·4

Some 30 pages are devoted to reports from experts of sorghum, giving some account of the history of several of the sorghum sugar companies, reports which are all the more valuable, as they give the dark as well as the bright side of sorghum growing.

About 70 pages and some dozen engravings of the machinery used are given to beet sugar; there is a full account of the Alvarado Factory, with views of the works, &c.

Maple sugar occupies 30 pages.

There are several pages of analyses of beets, of beet and cane juices, of juices from siloed cane, of maple sap, taken from trees at different heights, from different sides of tree, and at different times of day, of maple syrup and maple sugar, as well as sorghum. The amount of detail gone into in this report is surprising.

* New York Shipping and Commercial List, as copied in Bouchereau's Louisiana Reports.

† Ton = 2,240 pounds.

‡ Estimated by F. B. Elliott, Actuary of the Treasury.

§ Census.

Altogether it is a most valuable contribution to the literature of sugar. Mr. Wiley, its author, and chemist to the United States Department of Agriculture, is a gentleman who is accustomed to weigh his words. Those of our readers who may be wishful to post themselves up in what is being done in the United States, in the growing and manufacture of sugar at the present time, cannot do better than consult Mr. Wiley's report.

It is printed by the United States Government for free distribution. Copies, we imagine, can be obtained by applying to the nearest United States Consul.

MONTHLY LIST OF PATENTS.

Communicated by Mr. W. P. THOMPSON, C.E., M.S.C.I.,
Fel.Inst. P.A., Patent Agent, 6, Lord Street, Liverpool; and
323, High Holborn, London, W.C.

ENGLISH.

7533. ADRIEN RALU (fils), JOSEPH GRATHVOHL, and HORACE A. BROWNE, London. *Solidifying syrups and molasses, especially those of sorgho and sugar cane, by mixing them with substances adapted for distillation.* 20th June, 1885.

7745. CHARLES W. GUY, London. *Improvements in sugar cane crushing mills.* 25th June, 1885.

7882. EDWIN EDWARDS, London. *A mould or apparatus for the manufacture of sugar whistles.* 29th June, 1885.

8279. HENRY H. LAKE, London. (A communication from abroad, by Franz O. Matthiessen, U.S.A.) *Improvements relating to the filtration and solid decolorization of sugar liquor or syrup, and to apparatus therefor.* 8th July, 1885.

319770. EDWARD F. DYER, Alvarado, California. *Manufacture of beet-sugar.* June 2nd, 1885. The molasses is not subjected to any of the "strontia," "osmosis," "elution," or "substitution" processes for the elimination of salts or other impurities. Instead of then being boiled in the vacuum-pan to a condition necessary for granulation in tanks in accordance with the usual methods, it is mixed with a certain proportion of raw juice defecated and clarified with lime. The proper proportion of molasses is mixed intimately with the raw juice, either hot or cold. The defecation or carbonation is carried on in the usual manner with the excess of lime or its compounds, which removes the colouring matter and any impurities that will chemically combine, while the large percentage of gum, albumenoids, and other colloids that could not be otherwise eliminated are mechanically removed by the copious precipitate from the raw juice.

319493. JOHN LAIDLAW, Glasgow. *Centrifugal machine.* June 9th, 1885. This invention applies to that class of centrifugal machines or hydro-extractors, in which the basket is carried upon a hollow vertical shaft,

which is supported upon, and is rotated around a suspended stationary shaft. The novelty of the invention consists in bearings, in which are arranged one set or tier, or two or more such sets or tiers of rollers of truncated conical form, between correspondingly-coned rings or washers, the whole being situated around the inner stationary shaft, and within the outer rotating shaft for a bearing for supporting a vertical rotating shaft at its lower extremity; the rollers which may be in one, two, or more tiers, are arranged around a short vertical shaft or plug, and the whole of the bearing surfaces within an oil containing vessel.

5399. W. R. LAKE, London. (Communicated from abroad, by Frederick Napravil-Bohemia, Austria. *Improvements in the manufacture of sticks or bars of sugar, and in apparatus therefor.* May 1st, 1885. This invention relates chiefly to moulds for casting sugar sticks, made of flexible sheet metal, and the sugar sticks are enclosed between three-mould sides, from which they are detached by bending one mould side. The moulds are formed substantially of sheet metal plates, having a series of parallel sheet metal ribs, and inserted, in close order, into a cast-iron case. This case is of square section, and its sides converge towards its bottom portion, which is either open or perforated. The ribbed sheet metal plates are held in the case by means of wedges. When the sugar with which the mould is filled has solidified, the cases are placed in a centrifugal machine, wherein the sugar is freed from green syrup, and whitened. The whole contents of the case are then withdrawn from the same, and by bending the sheet-metal plates by means of a stamp having a convex under surface, which is pressed against the ribbed plate, the sticks of sugar are loosened.

320595. A. L. SIEGHÖRTNER, JR., St. Louis, Missouri. *Centrifugal machine.* June 23rd, 1885. The invention consists of a rotating basket, having a fixed top flange, and a bottom with central depressed portion having openings, a false flange below the top flange, a ring-shaped opening between the false flange and the body of the basket, an interior annular body of filtering material between the false flange and the bottom, and a valve extending over the depressed portion of the bottom, and having an upwardly-bent and perforated rim for the passage of liquor to be filtered.

8541. HIPPOLYTE LEPLAY, London. *Improvements in decarbonating the carbonates of strontia and baryta and in apparatus therefor.* 14th July, 1885.

8783. ROWLAND BATEMAN, Birmingham. *Improvements in sugar crushers.* 21st July, 1885.

8843. GEORGE M. NEWHALL and JOHN H. TUCKER, London. *Improvements in treating sugar and like substances, and in apparatus therefor.* 22nd July, 1885.

8857. CHARLES LYLE and JOHN LYLE, London. *Improvements in apparatus for cleansing sugar.* 22nd July, 1885.

8924. ADRIEN RALUFILS, JOSEPH GRATHVOHL and HORACE A. BROWNE, London. *Improvements in preparing and treating syrups and molasses, especially those of sergho and sugar cane, by mixing them with substances adapted for distillation, and in the manufacture of spirit therefrom.* 23rd July, 1885.

9204. DANIEL K. CLARK and WILLIAM J. E. FOAKES, London. *Improvements in filter presses.* 31st July, 1885.

9249. ALFRED G. WASS, London. *The improved utilization of sugar scum.* 1st August, 1885.

9326. WILLIAM LAKE, London. (Communicated by Franz. O. Matthiessen, U.S.). *Improvements in the manufacture of hard sugar.* 4th August, 1885.

14402. ADOLPHUS STROMBERG, Magdeburg, Prussia. *Improved Machine for Slicing Sugar Cane.* 31st October, 1884. The machine consists substantially of a horizontal rotating disk having slits, to the edges of which cutters are fixed, and of inclined hoppers arranged above the disk, and through which the cane is conducted to the latter by its own weight, and so as to be presented slantwise to the cutters.

12469. ALBERT FESCA, Berlin. *Improvements in the Manufacture of Sugar and in Apparatus therefor.* 16th September, 1884. The inventor forms his moulds for prisms of sugar, so that in the centrifugal machine the prisms shall be radial, and between the prisms and the centre of the machines he forms an extension of the mould into which he places a sludge of grain sugar and water or grain sugar and syrup. The moulds are first put to stand on end till this sludge has sufficiently drained through the sugar prisms and consolidated so as to stand horizontally. The moulds are now placed in the centrifugal and liquored in the ordinary manner. The liquor poured in at the centre is soaked up by the porous mass in the extensions of the moulds which acts as a sponge to absorb and convey in a regular supply the liquor spasmodically admitted at the centre.

322069. E. ROTHE, Breitenau, near Oedran, Germany. *Centrifugal Machine.* July 14th, 1885. Round the basket are stout rings to prevent it bursting, and suspended from these rings are other heavy rings concentric with the basket and some distance off. If the basket wobbles these suspended rings veer in the reverse direction, and so check the eccentricity.

322762. W. H. TOLHURST, Troy, New York. *Centrifugal Machine.* July 21st, 1885. The Inventor suspends his centrifugal basket by a universal joint with pulley round it on the same plane. The bottom step rests on a plate of spherical surface having the universal joint for its centre, and the step rests on this spherical surface, and is free to slide about within an area bounded by a circular flange. The step brasses are spherical, and the end of the shaft conical; by this arrangement the brasses are free to turn in the shoe, and the shoe is free to turn or slide in the spherical bottom plate.

GERMAN.

ABRIDGMENTS.

29028. PAUL VONHOF, Sachsenburg, Thuringia. *An overflow filter for filtering sugar juices.* 6th February, 1884. An inverted conical vessel is covered with a filter cloth, which is fastened firmly on its rim by a ring fixed in the cover. The cover pivots on a hinge, and is pressed down by the aid of several levers and eccentrics upon the vessel. The ring is provided with discharge holes, which discharge into an adjoining channel surrounding the whole apparatus. After entering the vessel by a pipe the syrup penetrates the filter cloth and flows away through the channel, the sludge being discharged from time to time through a discharge cock.

29124. JAMES HENRY ROSS, Buffalo, Eri, U.S.A. *Process for producing crystallised hydrate of grape sugar.* 15th August, 1883. A cooled concentrated solution of grape sugar is brought by again heating to a liquid condition, ostensibly in order to facilitate the separation of the dextrine contained in the grape sugar from the same. The sugar obtained from the liquid mass is then crystallised out at a lower temperature.

29303. MATHIAS MELICHAIR and IGNATZ KEYS-VRBATEK, Austria. *An arrangement for evaporating the thin juices of the sugar factory.* 22nd November, 1883. The thin juice is evaporated in the ordinary boilers, which are furnished with large juice reservoirs, and the steam which is generated used for heating "Roberts'" evaporating apparatus, in which the juice is further concentrated. After leaving the boiler the steam passes through a juice regulator, and from thence is drawn off through a pump according as it is required into a reservoir from which the evaporating apparatus is supplied.

29759. HIPPOLYTE LEPLAY, Paris. *Improvement in osmose apparatuses.* 12th June, 1884. A flat evaporating pan is fixed over the frames of the ordinary osmose apparatus; the said pan is connected with the inner molasses frames, and is provided with a steam coil. The sides of the pan are formed by the sides of the frames prolonged upwards, and caulked by strips of parchment or gutta percha between their edges. The tops of the frames form the floor. The molasses during the osmose is being continuously concentrated by evaporation. In this process the greater the concentration of the molasses the more effectually are the salts separated from the sugar.

31244. HIPPOLYTE LEPLAY, Paris. *Improvement in osmose apparatuses.* 29th June, 1884. This osmose and evaporating apparatus with triple effect brings about simultaneously the osmotic separation of the salts from the molasses, the evaporation of the osmose water and the continuous evaporation of the molasses, which, by the osmose action, becomes more and more diluted. It consists in its simplest form of two flat pans placed over one another, separated by a perforated partition, which has parchment paper placed against it. The top pan contains the molasses, and may be provided

either with a cold water coil, or with a perforated pipe for cold air, while the bottom one contains water, or, at a stage further on, exosmose water, which is heated by a steam coil. The vapour which rises condenses on the parchment paper and keeps the molasses hot, the condensing water which forms acts upon the osmose, and at the same time again evaporates the water which flows over from the upper surface to the molasses, so that its high concentration is preserved. The ordinary osmose apparatuses with vertical parchment paper frames are converted into the new apparatus by opening part of the frames underneath and joining them to an osmose water evaporating pan, the alternating frames which lie between are opened from above, and by lengthening the side pieces of the frames an evaporating pan for the molasses can be placed upon them. The parchment paper is laid on each side of the perforated plates and slightly inclined. The mode of operation resembles that already described. The vapour which rises from the heated exosmose water forces itself into the chambers, condenses and flows laden with salts back into the pan, while the water which has penetrated through the parchment paper evaporates from the upper surface of the molasses.

29754. ALBERT ZABEL, Breslau, and A. WAHNER, Michelsdorf, Schweidnitz. *Continuous working evaporating apparatus, consisting of one or more heating centres.* 27th May, 1884. The sources of heat are fixed in a cylindrical apparatus, which is connected by supports with an air pump. They consist of two parts, an upper and a lower, heated with steam, and formed with double sides in the shape of an obtuse cone; the surfaces of the cone are alternately inclined. Concentric partitions are fixed on the upper sides of both surfaces, which form steps. This form of upper surface can be attained by using corrugated sheet metal. The juice in course of evaporation trickles down over the steps of the heating bodies.

29760. CARL SCHERER, Langen. *Improvement in filters.* 14th June, 1884. In order to be able to apply great pressure in filtering through simple filter bags, they are completely surrounded with wirework or perforated sheet metal, which takes up the heavy pressure from the bag, which is only loosely in contact with it. The liquid is forced through a pipe which is fastened into one end of the filter bag. In order to hasten the filtration the wirework can be surrounded with a jacket connected with an air pump for the simultaneous removal of the liquid, as also with a steam jacket.

Patentees of Inventions connected with the production, manufacture, and refining of sugar will find *The Sugar Cane* the best medium for their advertisements.

The Sugar Cane has a wide circulation among planters in all sugar producing countries, as well as among refiners, merchants, commission agents, and brokers, interested in the trade, at home and abroad.

IMPORTS (UNITED KINGDOM) OF RAW AND REFINED SUGARS.

JANUARY 1ST TO JULY 31ST, 1884 AND 1885.

Board of Trade Returns.

RAW SUGARS.	QUANTITIES.		VALUE.	
	1884.	1885.	1884.	1885.
	Cwts.	Cwts.	£	£
Germany	3,679,668	5,044,681	3,013,289	3,041,021
Holland	87,146	139,815	74,090	93,079
Belgium	344,744	257,421	299,840	174,367
France	33,083	22,212	33,456	17,691
British West Indies & Guiana	2,164,474	1,859,904	2,146,977	1,512,447
British East Indies	682,758	316,753	432,982	151,408
China and Hong Kong	103,647	14,679	71,476	5,644
Mauritius	205,163	133,851	160,678	92,771
Spanish West India Islands	365,435	416,109	285,652	303,639
Brazil	1,061,751	1,039,560	842,991	619,766
Java	2,454,318	2,799,023	2,345,706	2,117,471
Philippine Islands	520,236	182,269	350,679	88,085
Peru	270,031	345,537	246,462	240,437
Other Countries	334,089	379,801	301,148	361,522
Total of Raw Sugars ..	12,306,543	12,951,615	10,605,426	8,719,348
Molasses	311,908	240,915	112,809	81,752
Total Raw Sugars ....	.....	.....	10,718,235	8,801,100
REFINED SUGARS.				
Germany	402,724	563,772	442,613	471,565
Holland	777,742	826,259	874,030	740,917
Belgium	52,419	50,465	63,204	50,354
France	742,311	389,362	874,391	364,158
United States	603,205	1,682,669	637,024	1,515,659
Other Countries	25,276	2,167	25,276	11,822
Total of Refined	2,603,677	3,514,695	2,916,538	3,144,475
EXPORTS.				
	Cwts.	Cwts.	£	£
Raw	341,589	244,743	127,483	117,480
Refined	108,460	128,692	251,552	163,478
Molasses	31,691	23,515	14,242	9,920
Total Exports	481,740	396,950	393,277	290,878

SUGAR STATISTICS—GREAT BRITAIN.

To AUGUST 22ND, 1885 AND 1884. IN THOUSANDS OF TONS, TO

	STOCKS.		DELIVERIES.		IMPORTS.	
	1885.	1884.	1885.	1884.	1885.	1884.
London	100	106	215	230	225	250
Liverpool ..	117	117	181	181	187	220
Bristol	6	5	35	35	36	34
Clyde	89	62	154	157	194	158
Total ..	312	290	585	603	642	662
Increase..	22		Decrease ..	18	Decrease ..	20

SUGAR STATISTICS—UNITED STATES.

(From Messrs. Willett & Hamlin's Circular, New York.)

FOR THE FOUR PRINCIPAL PORTS. IN THOUSANDS OF TONS, TO THE NEAREST THOUSAND. FOR JULY, 1885 AND 1884.

	STOCKS.		DELIVERIES.		IMPORTS.	
	Aug. 1st, 1885.	1884.	For July, 1885.	1884.	For July, 1885.	1884.
New York	127	141	62	67	67	66
Boston	40	32	11	16	10	17
Philadelphia....	9	8	10	9	11	10
Baltimore .....	..	1	..	..	..	..
Total.....	176	182	83	92	88	93
Decrease..	6		Decrease..	9	Decrease..	5
Total for the year ..	..	..	689	638	777	759

In the case of Baltimore, where nothing is put down, it means that the Stock, Imports, and Deliveries, do not exceed 500 tons in each case.

NEW YORK PRICES FOR SUGAR.

From Willett, Hamlin & Co.'s Report, July 16th, 1885.

FAIR REFINING.	96 ^c CENTS.	GRANU- LATED.	STAND. A.	STOCK IN FOUR PORTS.
Aug. 13, 1885.—6½c.	5 15-16c.	6½c.	6-6½c.	Jan. 1, 1885—89,186 tons.
Aug. 14, 1884.—4½c.	5 11-16c.	6 9-16c.	6 1-16c.	Jan. 1, 1884—60,900 tons.
Aug. 16, 1883.—6½c.	7 9-16c.	8 11-16c.	8 3-16c.	Jan. 1, 1883—50,297 tons.
Aug. 17, 1882.—7½c.	8c.	9½c.	8½c.	Jan. 1, 1882—43,927 tons.
Aug. 18, 1881.—7 11-16c.	8½c.	9½c.	9½c.	Jan. 1, 1881—66,999 tons.
Aug. 12, 1880.—7½c.	8 17-32c.	10½c.	10½-½c.	Jan. 1, 1880—63,558 tons.
Aug. 14, 1879.—6½c.	7 11-32c.	8 7-16-½c.	8½c.	Jan. 1, 1879—50,773 tons.
Aug. 15, 1878.—7 1-16c.	7 29-32c.	9½c.	8½-9c.	Jan. 1, 1878—43,230 tons.
Aug. 16, 1877.—8½c.	9 1-16c.	10½c.	10½-½c.	Jan. 1, 1877—25,885 tons.

STOCKS OF SUGAR IN THE CHIEF MARKETS OF EUROPE ON THE
30TH JUNE, FOR THREE YEARS, IN THOUSANDS
OF TONS, TO THE NEAREST THOUSAND.

Great Britain.	France.	Holland	German Empire.	Austria.	Remaining four principal entrepôts.	TOTAL 1885.	TOTAL 1884.	TOTAL 1883.
311	194	43	117	24	29	718	600	462

CONSUMPTION OF SUGAR IN EUROPE FOR THREE YEARS, ENDING
30TH JUNE, IN THOUSANDS OF TONS, TO THE
NEAREST THOUSAND.

Great Britain.	France.	Holland	German Empire.	Austria.	Remaining four principal entrepôts.	TOTAL 1885.	TOTAL 1884.	TOTAL 1883.
1208	499	51	390	195	321	2664	2460	2448

ESTIMATED CROP OF BEET ROOT SUGAR ON THE CONTINENT OF EUROPE,
FOR THE PRESENT CAMPAIGN, COMPARED WITH THE ACTUAL CROPS
OF THE THREE PREVIOUS CAMPAIGNS.

(From *Licht's Monthly Circular*.)

	1884-85.	1883-84.	1882-83.	1881-82.
	Tons.	Tons.	Tons.	Tons.
France.....	315,000	.. 473,676	.. 423,194	.. 393,269
Germany Empire ..	1,150,000	.. 986,403	.. 848,124	.. 644,775
Austro-Hungary....	540,000	.. 445,952	.. 473,002	.. 411,015
Russia and Poland ..	380,000	.. 307,697	.. 284,991	.. 308,799
Belgium	90,000	.. 106,586	.. 82,723	.. 73,136
Holland and other Countries.....	50,000	.. 40,000	.. 35,000	.. 30,000
Total.....	2,525,000	2,360,314	2,147,034	1,860,994

The *total* estimate here given is the same as in the three previous months. In the present estimate that for France is 10,000 tons less than last month, for Russia and Poland, 10,000 tons more.

STATE AND PROSPECTS OF THE ENGLISH SUGAR MARKET.

The market during the past month has been very irregular, prices changing almost daily. Beet 88 per cent. fell to 14s. 9d. in the first week, the next week the price rose to 15s. 3d., the week following it was again 14s. 9d. At the close, owing to the unfavourable accounts of the prospects of the French crop, the price advanced to 15s. 6d. to 15s. 9d. prompt, and 16s. 6d. to 16s. 9d. October-December, with a firm market.

Le Sucrierie Indigène is in despair about the French production, and says: "People are anxiously asking, What will be the result of the crop? The evil is now irreparable; if the drought continues, there will not be 100,000 tons of sugar made; if abundant rain comes, the quality of the beet will be execrable. In the first case, it means ruin to the cultivator; in the second, to the manufacturer. In both cases, a great reduction in the production."

The formation of a sugar syndicate at Magdeburg, at this period of the campaign, is some proof of the confidence of the Germans themselves in the great reduction which will take place in their production of sugar this year. From present appearances, and without taking the gloomiest view of the prospects of the French crop, the general deficit for 1885-1886, in the European beet crop, will be over, rather than below, half a million of tons.

The Cuban crop shows a surplus of about 40,000 tons over last year. On the other hand the expected deficiencies are, in the Brazil crop 35,000 tons, Demerara 45,000 tons, Louisiana 35,000 tons, and Martinique 8,000 tons. Of the other West India Islands, only Trinidad and Barbados show full crops. Altogether the outlook is a favourable one for holders of raw sugars.

On the 22nd August, the deliveries in the United Kingdom show a decrease of 18,040 tons as compared with the same period last year, and the imports show a decrease of 19,828 tons.

The imports of American refined for the seven months ending July 31st, amounted to 84,126 tons against 30,436 tons for the same period last year.

The stocks on 22nd August in the United Kingdom were 311,599 tons, against 289,211 tons in 1884, and 2,157,118 tons in 1883.

Present quotations for the standard qualities, as under, are:—


FLOATING.		Last Month.
Porto Rico, fair to good Refining	15/- to 15/6 against	15/3 to 15/9.
Cuba Centrifugals, 96% polarization	17/- to 17/3	16/9 to 17/3.
Cuba Muscovados, fair to good Refining ..	14/6 to 15/-	15/3 to 15/9.
Bahia, middling to good Brown, No. 7 to 8½	12/6 to 13/6	13/- to 14/6.
Pernambuco, good to fine Brown	14/- to 14/3	15/- to 15/3.
Java, No. 14	17/9 to 18/-	17/6 to 17/9.
LANDED.		Last Month.
Madras Cane Jaggery	11/- to 11/6 against	10/6 to 11/-.
Manilla Cebu and Ilo Ilo	11/6 to 12/-	10/6 to 11/-.
Paris Loaves, f.o.b.	20/- to 20/6	19/6 to 20/-.
Titlers	21/-	20/6
Tate's Cubes	23/-	22/-
Austrian-German Beetroot, 88% f.o.b. ..	15/6 to 15/9	15/6 to 15/9.

THE SUGAR CANE.

No. 195.

OCTOBER 1, 1885.

VOL. XVII.

 The writers alone are responsible for their statements.

N.B.—All communications to be addressed, and Cheques and P.O. Orders made payable to HENRY THORP, Ducie Chambers, 57, Market Street, Manchester.

For Scale of Charges for Advertisements, see page xi.

For Table of Contents, see opposite the last page of each Number

The *London Gazette* of September 15th contains a Treasury Warrant for the extension of the Parcel Post to Grenada and Trinidad; the rate being fixed at 8d. for the first, and 6d. for each succeeding pound.

We regret to record the death, on the 19th ult., at the advanced age of 78 years, of William Eathorne Gill, of Hampstead. Mr. Gill was for several years a frequent contributor to our pages. Only within the past month we received a contribution from his pen—"A Way Out,"—which we give at page 541.

The question of "Sugar Refining by Electricity" is in a fair way of being shortly solved. We learn that the inventor, Professor Friend, sails from New York in the *Servia* on the 3rd inst. He brings his machine with him, and intends giving a demonstration in Liverpool, extending over several consecutive days, refining about five tons per diem. in the presence of witnesses who will see the raw sugar go into and the refined come out of the machine. This looks like business. One naturally asks why was not this done in New York? Why was it that the Committee of five gentlemen, of which the president and vice-president of the "Electric Sugar Refining Company" were members, were not allowed to see the process?

A deputation from the British Sugar Refiners, consisting of Messrs. Lyle (London), Crosfield (Liverpool), and T. Neill (Greenock), sailed on the 10th ult. for New York. The object

of their visit, is the abolition of the American drawbacks on the exportation of sugar, and with this view they will make known their case at headquarters at Washington. That a large amount of ignorance exists in the States on this bounty question is very evident; for in a recent number of the *New York Nation*—a very high class weekly—it was stated that they had not heard before of these bounties, and in fact doubted their existence. As a consequence of this bounty, the American refiners have exported to this country, during the first eight months of the present year, over 90,000 tons of refined sugar; and upon this the American people have paid, or in other words made a present to the consumers of sugar in Great Britain, of nearly £200,000; for a bounty is the amount that has been paid on export in excess of that which has been received.

INVENTIONS EXHIBITION.—MESSRS. T. Christy & Co., of Fenchurch Street, London, E.C., as introducers of new plants, drugs, &c., have gained a Bronze Medal, for a nice collection of their specialities in the South Central Gallery, Stand 1167.

MARKING BAGS OF SUGAR WITH INK.—A grocer writes to *The Grocer*, to say that in August last, he received five bags of Demerara,—when one of the bags was turned out, the contents were found to be saturated with ink, at least 28 lbs. being unfit for consumption, and the remainder damaged. The wholesale house repudiate any claim, stating that it must have been done in transit, and refer him to the railway company. He, however, firmly believes the damage was caused by the careless use of ink, when the bags were marked.

Ballata, the milk exuding from the bullet tree (*minnusops balata*), upon the bark being cut, and which when dried has a chemical composition, according to Dr. Hugo Nutter, F.R.S., probably identical with that of gutta percha, and of Caoutchouc, is receiving some attention in British Guiana at page 537. We give a short account of this new “industry,” with extracts from the report of Mr. G. S. Jenman, the superintendent of the Botanic Gardens, Demerara.

The Hawaiians are not unnaturally becoming alarmed at the rapid change taking place in the population of the islands. During

the month of June there arrived at Honolulu 144 white persons, three Hawaiians, and 524 Asiatics ; and there departed, during the same time, 302 whites and only 215 Asiatics—showing a total change in favour of the Chinese of 467 persons. By the census of 1884 there were 18,055 Chinese on the islands, which is known to have since increased 11 per cent., while during the past year the English-speaking race has fallen off about 8 per cent.

For the information of those who may still be wanting sets of *The Sugar Cane*, we are now able to supply three complete sets of 16 volumes, as per advertisement on page xi.

The U.S. Consul at St. Petersburg, in his report (see page 543), gives some interesting particulars of the Russian sugar industry. It would appear from it that the Russian sugar companies are not in the desperate condition which other reports had lead us to think they were ; many of the companies, for the year 1884, declaring dividends ranging from 8 to 20 per cent. The number of work-people employed in the sugar manufactories in 1883 was 94,580, of which 73,334 were males, 13,869 females, and 7,377 children. When we consider that the quantity of sugar produced in this year was not 300,000 tons, the numbers employed strikes one as excessive, for in this total is not included those engaged in beet cultivation.

Speaking of the American refined market, Willett, Hamlin, and Co., in their circular of Sept. 10, says : "The demand from the country constantly exceeded the supply, and all grades of refined advanced largely. This caused a good demand for raw sugars, of which refiners have much less stock than last year at this time, and prices of all grades of raws made a further improvement for the week. Stock in all hands decreased 11,804 tons, and is now 39,415 tons under last year. The same receipts and meltings as last year, from now to end of year, would give stock in all hands, Jan. 1st, of 64,984 tons against 104,399 tons last January. We look for larger meltings than last year, to meet which, receipts must necessarily come from Europe. At present the parity of prices does not admit of such importations, and we look for a further considerable reduction in our stocks and in Cuba stocks before such importations commence to any extent."

We learn from *The American Grocer* that the "Valley Sugar Company" is the title of a new organization which has started a factory for the manufacture of beet sugar in the White River, Washington Territory.

The following West India sugar estates are advertised for sale by Messrs. Hards & Jenkinson, London, on the 11th November next, in the Court of Commissioners for the Sale of Encumbered Estates :—

MONTSERRAT.

The Streatham Estate, in the parish of St. Anthony and St. George, and the Windward or White's Estate, in the parishes of St. George and St. Patrick, containing 1294 acres.

JAMAICA.

The Danks, in the parish of Clarendon, with certain other outlying lands; the whole containing 3616 acres.

The Amty Hall, also in the parish of Clarendon, containing 692 acres.

The Bog, in the parish of Clarendon, containing 1120 acres.

ANTIGUA.

The Friar's Hill, in the parish of St. John, containing 335 acres.

And on the 9th December the following sugar estates in Tobago are authorized to be sold by Messrs. Hards and Jenkinson :—

The Mary's Hill and Whim, in the parish of St. David, containing 665 acres.

The Betsy's Hope, Charlotteville, Goldsborough, Goodwood, King's Bay, Lure, Richmond, Glamorgan, Bushey Park, Spey Side, and Trois Rivières, in the parishes of St. Paul and St. Mary, containing 11,392 acres.

Acheuskioch, Prospect, and Orange Valley, in the parishes of St. Andrews and St. Patrick, containing 1129 acres.

Orange Hill and Amity Hope, and Burleigh Castle and Spring Garden, in the parishes of St. David and St. Andrew, containing 1464 acres.

ST. VINCENT.

Belvedere and Brighton, at Calcagua and St. George respectively, and Calder and Calder Bridge and Argyle, are also to be sold early in December.

At page 549 will be found "Some Results of the Campaign 1884-85 in Germany."

THE BOUNTY ON THE EXPORTATION OF REFINED SUGAR FROM THE UNITED STATES.

We will put the proofs of the existence of the bounty in as small a compass as we can, for the information of those who are still sceptical on the point, and add short extracts from American papers.

1. There was the same trouble about the drawback being excessive when the duties were altered in 1875. After two years of discussion and official enquiry, the Secretary to the Treasury issued a memorandum, dated September 5th, 1877, in which he said:—

“I am entirely satisfied, by careful examination of the subject, especially of the reports made by Commissions recently held in New York, Boston, and Baltimore, that the rates of drawback fixed by the regulation of December 17th, 1875, are too high, and amount to more than the duty paid by importers on the raw sugar used in the manufacture of refined sugar, and now amount to a bounty and an actual loss to the Government of a very large sum.”

The memorandum concluded by ordering the reduction of the drawback from 3·60 cents per pound to 3·18 cents per pound. The Secretary to the Treasury therefore admitted that the previous drawback gave a bounty of 42 cents per 100 pounds, as had been alleged by the British Sugar Refiners.

But when the duties were reduced in 1883 the drawback was not reduced in the same proportion, and it appears that the present drawback on hard sugar bears exactly the same relation to the duty on raw sugar that the excessive drawback of 1875 did, which was admitted by the Treasury Department to give a bounty of 42 cents per 100 pounds, as stated in the memorandum of September 5th, 1877, quoted above. The present drawback must therefore be excessive to the same amount.

2. The duty on raw sugar is now levied in proportion to the pure sugar contained in it, the scale beginning at the bottom with sugar containing 75 per cent. of pure sugar, which is charged with a duty of 1·40 cents per pound, and going up at the rate of ·04 cents per pound for every additional percentage of pure sugar, so that 100 per cent. of pure sugar, *i.e.*, pure sugar, would pay 2·40 cents per pound. Why then should 2·82 cents per pound be returned on exportation of pure sugar? It is evident,

according to this scale of duties, that a raw sugar containing 76 per cent. of pure sugar is estimated to yield $\frac{1.44}{2.40} \times 100$, or 60 per cent. of pure sugar, and so on up the scale, which therefore runs thus:—

Raw sugar containing 76			{ per cent. of pure sugar is estimated to yield }			60 per cent.	
"	"	"	79	"	"	"	"
"	"	"	82	"	"	"	"
"	"	"	85	"	"	"	"
"	"	"	88	"	"	"	"
"	"	"	91	"	"	"	"
"	"	"	94	"	"	"	"
"	"	"	97	"	"	"	"

The excess of drawback is therefore fully proved as follows:—

Percentage of pure sugar contained in the raw sugar.	Equivalent yield of extractable pure sugar as calculated from the scale.	Drawback allowed on this yield, at the present rate of 2.82 cents per 100 pounds.	Duty paid on the raw sugar.	Excess of drawback.	Excess per 100 lbs. of pure sugar.
76	60	1.692	1.44	.252	.42
79	65	1.833	1.56	.273	.42
82	70	1.974	1.68	.294	.42
85	75	2.115	1.8	.315	.42
88	80	2.256	1.92	.336	.42
91	85	2.397	2.04	.357	.42
94	90	2.538	2.16	.378	.42
97	95	2.679	2.28	.390	.42

3. But it may be urged that because the refiner converts his raw sugar into various proportions of hard and soft sugar, syrup, and waste, therefore the above calculation does not apply to all cases. Let us see if this is so. The refiners say that they get out of 100 pounds of raw sugar, 60lbs. of hard sugar, 24lbs. of soft sugar, $11\frac{1}{2}$ lbs. of syrup, and $4\frac{1}{2}$ lbs. loss of weight. According to the yield on which the scale of duties is based, as previously shown, this yield stands as follows:—

	Per cent. of pure sugar.
60lbs. hard sugar	60
24lbs. soft sugar (1.84 drawback=76.6 per cent. yield)	18.38
	<u>78.38</u>

The drawback and duty received by the refiner are:—

	Dollars per 100lbs.
60lbs. hard (drawback 2·82)	1·69
24lbs. soft (duty at least 1·84)	·44
11·5lbs. syrup .. .. .	..
4·5lbs. loss of weight .. .. .	..
Total duty returned	2·13
Duty paid on the raw sugar (78·38 yield or 87 polarization)	1·88
Excess	·25

Which is equal to an excess of drawback on 100 pounds of hard sugar of 42 cents, exactly the same result as before.

The American press has referred from time to time to this scandal.

1. In the annual review of the sugar trade, the *New York Shipping and Commercial List* said, on the 17th January of this year:—

“One of the most notable features of the operations of the year has been the large exports of refined, aggregating 63,643 tons, the bulk of which has been shipped from the port of New York. The increase, compared with last year, which aggregates over 50,000 tons, has been mainly shipments made to Great Britain, where the product of our refineries has found ready sale and successfully competed with the output of British refineries. This has been possible, however, solely in consequence of the drawback allowed to exporters under the present tariff law, which is tantamount to a bounty, and has given our refined product an advantage which it could not have obtained otherwise in a country where sugar is admitted free of duty.”

2. The *New York Price Current* of April 8th says:—

“For some time past the value of refined sugar has been maintained almost wholly by the export demand for granulated, which is profitable to refiners because of the drawback allowance which the Government makes, and which in reality amounts to a bounty estimated at about 50 cents per hundred pounds.”

3. Shortly after that date *Bradstreet's* journal writes as follows:—

“It is generally admitted that the present drawback upon hard sugar is equal to a bonus of 50 cents per hundred pounds. As this amount comes out of the Treasury, the refiners have been exporting sugar at the country's expense. Last year over 50,000 tons were exported, which, at the present rate of drawback, cost the Treasury

\$500,000. Already this year nearly \$180,000 have been paid out in subsidies to refiners.* The appointment of the Commission comes none too soon; and it is to be hoped that the investigation will result in instituting more equitable rates."

4. The *Evening Post* of June 13, speaking of the evidence taken by the Commission, says:—

"The fact was pointed out that, while the highest rate of duty that could be collected on raw sugars—absolutely pure, if there could be such a thing—would be 2·40 cents per pound, the Government is paying drawbacks on hard sugars at the rate of 2·82 cents per pound, such sugar testing no more than 100 per cent. of saccharine by the polariscope."

5. The *Merchants' Review* of the 19th June, says:—

"In putting the excess of drawback at 41 cents per hundred pounds, the correspondent of the *Evening Post* placed it far too low, as it is generally admitted by all impartial members of the trade that it is quite 50 cents per hundred pounds over the duty paid, taking in consideration the loss in refining as well. . . . Why our sugar refiners should be favoured by a subsidy from the national Treasury which, if it continues at the present rate for the remainder of the year, will not fall far short of \$2,000,000 is, to say the least, most unjust, at all events to the American taxpayer."

6. *Bradstreet's* of the 25th July shows that the bounty amounts to 50 cents per hundred pounds, and that it enables the refiners to sell refined sugar for export at a lower price than they give for the raw sugar. The writer, after proving these two points, goes on to say:—

"Nothing could demonstrate the absurdity of the present rate of drawback more clearly than the above. A refiner pays 6½ cents per hundred more for raw sugar testing 2° less saccharine than he sells refined for. Not, however, to the American consumers, but to foreigners. After paying the expenses necessary to refining by the assistance of a drawback which clearly amounts to a subsidy of about 50 cents a hundred pounds, our large sugar monopolists are assisted by the Government to increase the cost of sugar to American consumers. . . . If the sugar refiners are to have a subsidy of 14 per cent., then why should not our cotton, wool, iron, and other manufacturers? . . . Besides, this bounty presses hard upon the consumers. They not only have to pay the tax, but during the late

* Now increased to 850,000 dollars.

rise they were compelled to pay more for their sugar than they otherwise would have done, had not the export demand caused by selling sugar to foreigners at less than cost, the Treasury paying the difference, increased prices."

7. The writer of an official report on *the Sugar Industry of the United States*, issued by the Department of Agriculture, gives the calculations by which the British refiners prove the amount of the bounty, and also the report of the Committee of Experts appointed by the Treasury Department. The writer then goes on to say:—

"On comparing the data contained in the report of the Treasury Commission, as given above, with those of the Committee of British Refiners, the points of difference are found to be many and striking. The bias of self-interest which we must allow to have some influence in the British report is presumably absent in that of the Treasury Commission. Yet I believe it will appear, on careful study, that the report of the Commission is really in the interest of the American refiners. The difficulty which this Commission experienced in getting reliable information of the yield of refined sugar is one of real magnitude. When it is further considered that refiners would naturally impart such information as would tend to their own interests, it must be granted that the figures of the Commission are open to serious criticism."

After fully examining the question, the writer concludes as follows:—

"It is evident, therefore, that the rate of drawback which should be paid on pure sugar exported is 2.49 cents per pound; and this rate should be diminished for less pure sugar *pari passu* with their decrease in saccharine strength, as determined by the polariscope."

FIBRE AND PLANTING COMPANY OF SOUTHERN INDIA.

This company has been registered by V. Musgrave, Albert Buildings, Queen Victoria Street, London, E.C. Objects: To cultivate, deal in Rhea, hemp, and other fibre-producing plants, pepper, tea, cocoa, coffee, and tobacco. Capital: £20,000 in £5 shares. Signatories (with one share each): Lieut.-Col. F. Henderson, 66, Gloucester Street; J. H. Ankins, 141, Fenchurch Street; C. E. Collyer, 141, Fenchurch Street; L. G. Grant, 141, Fenchurch Street; J. Vernon Musgrave, Albert Buildings, Queen Victoria Street; A. Leslie, 9, Mincing Lane; Captain H. Hunter, 46, Lower Belgrave Street, Eaton Square. Number of directors not less than three nor more than six.

SOME FACTS ABOUT CANE CRUSHING IN DEMERARA WITH STEWART'S HYDRAULIC MILL.

Chemical Laboratory,

Tuschen de Vrienden,

3rd September, 1885

AVERAGE WORK OF DE WILLEM MILL, AUGUST, 1885.

CANES.		JUICE.		GREEN MEGASS.	
	Per cent.		Per cent. by volume.		Per cent.
Sucrose	9.48	Sucrose	12.64	Water	50.09
Glucose	82	Glucose	1.76	Total sugar	6.76
Fibre	14.11	Total Sugar...	14.40	Fibre	43.15
		Speci. Gravity.	10.60		
Total sugar..	10.30	Total sugar %			100.—
		by weight ..	13.58		

43.15 fibre in megass = 56.85 juice; 14.11 fibre in cane = 18.59 juice; $100 - 14.11 + 18.59 = 67.30\%$ *crushing*.

$67.30 \text{ juice} \times 13.58\% \text{ sugar} = 9.14 \text{ sugar extracted from 100 canes, containing 10.30 of total sugar. } 9.14 \text{ of } 10.30 = 88.78\% \text{ of sugar extracted by mill.}$

The 18.59 % of juice left in megass contained only 11.88 % total sugar, as compared with 67.3 juice at 13.58 % sugar.

Average pressure on accumulator, 27 cwt. per square inch.
Indicated horse power, 90.

Average gallons juice made per hour, $10.23 = 1000 \text{ lbs. sugar.}$

(Signed) J. OWEN ALEXANDER.

This simply means that with such canes and such crushing, an engine, mill, and gearing of 200 indicated horse power is called for to make one ton of non-chemical sugar per hour.

200

7 lbs. coal per horse power.

1400 lbs. coal required for power, say two boilers $7' \times 28'$

No high road to crush canes. Power in all parts must be there to meet strain.

Signed, W. R.

THE INVERT SUGAR COMPANY, LIMITED.

From "*The Citizen*."

The Patent Invert Sugar Company, Limited, has now published accounts extending from April, 1883, to June 15th, 1885, and a more unsatisfactory statement of affairs it is impossible to imagine. With the total receipts amounting only to £9,384 7s. 10d., they have managed to spend in producing them £16,004 3s., so that the net result shows a loss of no less than £6,619 15s. 2d. We should have thought that such an alarming position of affairs would have been sufficient to have sobered the most sanguine of men in their prophecies. But we find that the Chairman of the Company at the meeting of shareholders committed himself to the following estimate of the future results of the Company's working:—

"I have now before me Mr. Webb's (the Managing Director) estimate for the future work of the Company. I have it in detail. The figures are based on the present market prices of materials, and, therefore, judging from our experience with regard to the distillery, I think we may safely take his figures as being perfectly just, and they give us this result. By working the factory and distillery to their full extent, not by half measures, but by keeping them steadily going, we shall realise a net profit of nearly £400 per week, or £20,000 per annum, equal to a dividend of 25 per cent. upon the capital of the Company. I heartily congratulate the shareholders upon the position that the Company now occupies."

If this Company is in a position to make such large profits as they now expect to do, how has it been possible that the results of their operations have hitherto only resulted in an enormous loss? It is absurd to suppose that the change of one or two members of the Board is likely to produce a miraculous effect upon the prospects of the business, and upon what is it that the Chairman basis his sanguine expectations? Simply upon figures furnished by the Managing Director. Now this gentleman, we believe, has held his position from the commencement of the Company, and as, up to the present, he has been utterly unable to produce a profit at all, but, on the contrary, his management of the Company has entailed a ruinous loss, how any reasonable human being can seriously adopt his glowing estimates for the future baffles our apprehension. The new Chairman of this Company must be a man of a singularly confiding nature, and it

would be interesting to know to what extent he backs up his belief in his stake in the Company's shares.

The balance sheet of this Company which the Directors congratulate the shareholders in their report stands upon a firm basis, is as under:—

DR.		LIABILITIES.	
To Capital Account:			
6,000 vendors' shares issued as fully paid	.....	£60,000	0 0
2,000 shares, with £10 per share			
called up	.....	£20,000	0 0
Less calls outstanding	.....	1,542	0 0
			18,458 0 0
Sundry creditors	.....	1,165	14 8
			<u>£79,623 14 8</u>
CR.		ASSETS.	
By patent	.....	£60,000	0 0
Plant and machinery at factory	..	£5,755	13 4
At new distillery	.....	2,967	2 4
			8,722 15 8
Sundry debtors	.....		76 15 5
Stocks of syrup and materials	.....		1,549 18 9
Stocks of salvage	.....		176 10 6
Office furniture, stock on show, cards, &c.	.....		220 0 0
Cash at bankers and in hand	.....		2,257 19 2
Balance at debit of profit and loss account	.....		6,619 15 2
			<u>£79,623 14 8</u>

The balance at the debit of profit and loss account £6,619 15s. 2d., is rather more than one-third of the money found by the shareholders. In other words, the position of this Company, which "stands upon a firm basis" is, that up to the present they have lost more than one-third of the money put into the business. Under these circumstances we take it that the present value of the Company's shares may be placed at zero. It will be seen that the total liabilities amount to £79,623 14s. 8d., whilst the assets are of a very unrealisable character, and of very little value. The chief asset is the "patent £60,000," but as the utilization of this patent has only resulted in a large loss, its present value is *nil*. The other assets, even taking them at the full value stated in the balance sheet, only amount to £13,003 19s. 6d. So that if this Company, which "stands upon a firm basis," were to proceed to realisation it is not likely that the shareholders would receive back more than two shillings and sixpence in the pound on their capital.

THE HAWAIIAN COMMERCIAL AND SUGAR COMPANY.

SOME PARTICULARS OF ITS EXTENSIVE OPERATIONS.

ITS FUTURE PROSPECTS. A FAVOURABLE OUTLOOK.

The following is taken from a letter from Mr. Aloha Nui, of Honolulu, which appeared in a recent issue of *The San Francisco Merchant*.

In the March *Sugar Cane*, page 115, we gave some particulars of this Company's position which at that time was in a very unsatisfactory state.

But little is known in California of the locality or extent of the property belonging to the Hawaiian Commercial and Sugar Company, in which so many San Francisco business men are directly interested, so I propose giving you a few brief particulars of what will be the most gigantic enterprise in the Hawaiian Kingdom. The plantation proper is situated in the neighbourhood of Kahului on the island of Maui, and was in fact the making of that little town. For miles one passes through fields of cane before reaching the plantation with its four mills which are probably more complete in their machinery, fittings and general details than any other sugar mills in the world. To attain such a state of perfection has necessarily involved a large original outlay of capital. That such expenditure and investment was a judicious one will, I believe, be proved within a year or two. It is folly for anyone to imagine that, when inaugurating a big enterprise of this character, he can receive any large immediate returns.

The Company's stock consists of 100,000 shares of the value of \$100 each, making a total of \$10,000,000 on which \$23 per share has been paid up, or nearly one-fourth of the whole amount.* The Company controls 50,000 acres of land of which some 30,000 acres are freehold, the remainder being held under lease from the Government. It can easily be imagined that the cultivation of such a tract of country, and the manufacture of the sugar grown thereon, will require an enormous body of labourers. They necessarily require stores, provisions and clothing, and the imports from San Francisco and other ports on the Pacific Coast to Kahului alone aggregate the very

* In the May and July, 1883, *Sugar Cane*, we gave a detailed account of this enormous Sugar plantation, said to be the largest in the world.

respectable value of \$80,000 per annum. The whole working of the plantation has been most thoroughly systematized under the careful and economical management of Mr. George C. Williams. The yield of last season was 6,700 tons of sugar, and at the present time there are over 10,000 acres under cultivation, some of which will not produce a crop for a couple of years. It is in this connection that those who are unacquainted with the practical working of a plantation make such a huge mistake. The expenses incurred during last year, for instance, may seem unusually heavy in comparison with the receipts for that year. But this is not a fair basis of calculation because the expenses of last year cover more than two-thirds of the outlay necessary to ensure returns for the two following years. One year's expenses almost cover the crops of three years and if further planting operations were to be discontinued to-day it would take but a trifling sum, comparatively speaking, to market the sugar crops for the two succeeding years. This is a leading point which is not generally understood, but which plays an important factor in establishing the financial prosperity of sugar plantation property.

There are over 1,500 acres of land under cultivation for a new crop for this season in addition to the ratoons which will make the total cut close upon 2,500 acres for the coming season. There are also 2,500 acres under cultivation for the season of 1887. This means about ten thousand acres in all under actual cultivation. The Company has moreover ten thousand acres of new land at the foothills, the soil of which is of the richest character. A part of this has been planted and yielded six tons to the acre and four tons for ratoons. It is hardly fair to figure upon such a return for the whole area, but, estimating at five or even four tons the showing is a good one. The coming crop is placed, at a low estimate, at from 11,000 to 12,000 tons, and it is anticipated that the two successive crops will certainly aggregate the same total. Taking the price at \$100 to the ton this gives a return of from \$1,100,000 to \$1,200,000 for the year. The expenses, including interest, do not amount to \$60,000 a month which leaves nearly \$400,000 profit of which \$100,000 is utilized for payment of indebtedness, leaving about \$300,000 for disbursement in dividends. The returns for succeeding years should be even still larger on account of the increased acreage of cane coming into bearing which results from the necessary expenditures, involved one, two and three years in advance, for cane planted, the cane under cultivation and the cane

that is taken off. The irrigation system of the Company, derived from the Waihee river and the Haiku ditch, is now in thorough working order. Future expenses will be reduced to a minimum, through the Japanese labour system and efficient and judicious management. The heavy expenses necessary in establishing such a gigantic enterprise have been incurred. The consumption of sugar is increasing. The beet crop of this year shows a large shortage. The sorghum seed planted this year has proved to be a failure. Taking all these things into consideration, and making due allowance for future contingencies that it may be impossible to foresee, I am inclined to believe that the stockholders of the Hawaiian Commercial and Sugar Company have one of the best and safest investments ever known in San Francisco. The time will shortly come when they will ascertain without a doubt that every idea, calculation and estimate of the originators of the Company have been fully realized.

ALOHA NUI.

Honolulu, August 13th, 1885.

AMERICAN SUGAR REFINERY, SAN FRANCISCO.

The San Francisco *Journal of Commerce*, alluding to the incorporation of the American Sugar Refining Company with a capital of £200,000, says: "This establishment goes into the hands of some of our leading wholesale grocers and importing merchants, some of whom have long been closely connected with the Hawaiian Island traffic. The capacity of the present American Sugar Refinery is to be greatly enlarged, and it will, it is said, be a sharp competitor for the Sandwich Island sugar trade, which for a few years past has been largely under the control of Claus Spreckles and Sons. At present the island carrying trade, both by steam and sail, is largely under the control of the Spreckles faction. Still there is a wide and open field for honest competition. Nor is there any lack of tonnage available for the successful prosecution of the island trade. The Philippine Islands and other sugar producing countries are open to all buyers; neither is the Hawaiian sugar to be had under any more favourable terms than others, although it is here admitted free of duty under the Hawaiian Treaty."

DISSOLVED PERUVIAN GUANO.

The following letter will interest our planters :—

“Woodford Lodge” Estate,

Trinidad, 11th June, 1885.

Messrs. A. CUMMING & Co., Port-of-Spain.

Dear Sirs,—Having asked me to state my opinion as to the merits of Messrs. Ohlendorff's “Dissolved Peruvian Guano,” I do so now.

I first applied a large quantity on the St. Clair Estate, Arouca, in 1881, to both plant canes and rattoons, at the rate of 4 cwt. per acre. The result obtained in 1882 from the canes so treated was satisfactory; the crop, 774 hhds., being the largest that that estate has made either before or since. The average yield per acre was, as well as I can remember, nearly 2 hhds. Subsequent, while managing the St. Clair Estate, I applied other manures, but never obtained from their application the pleasing result which accrued from the use of Ohlendorff's Guano.

Last year (1884) I obtained from you 58 tons of the Dissolved Peruvian Guano (Ohlendorff's), which I applied to the canes of this estate (Woodford Lodge). The application, both as regards mode and quantity, was identical with that pursued at the St. Clair Estate, with a result even more gratifying, the crop (830 hhds.) was obtained from 146 acres plants and 230 acres of rattoons—50 acres of the former were planted only thirteen or fourteen months before they were reaped, and gave an average return of 3 hhds. per acre—nearly all these canes had no other manure than the Dissolved Peruvian Guano.

I found the juice very rich in saccharine, weighing as high as 11 degrees Beaumê. I recommend as early an application of this manure to both plant and ratoon canes as possible, for I found that the fields which received this manure ten months before cutting, gave a riper and consequently a heavier cane than those which I manured later.

For rattoons I advise two applications of $2\frac{1}{2}$ cwt. per acre each, with an interval of ten weeks between each application.

For plants I think one application of 4 cwt. per acre, applied when the young sprouts are two or three months old, will produce a favourable yield.

I have ordered from you 60 tons of this manure for crop 1886, so persuaded am I that it is the best and safest fertilizer I have yet met with.

I am, yours faithfully,

(Signed) S. HENDERSON.

THE ROYAL COMMISSION ON TRADE DEPRESSION.

The following is a list of those forming this Commission :—

Earl of Iddesleigh (late Sir Stafford Northcote), Chairman.

Earl of Dunraven.

Sir J. Allport, formerly Manager, and now a Director of the Midland Railway.

Mr. Aird, of Lucas & Aird, large employers of labour.

Mr. Lionel Cohen, a large financier.

Mr. Corry, Shipowner, and Tory M.P. for Belfast.

Mr. David Dale, of Darlington, representing the iron trade.

Mr. William Farrar Ecroyd, M.P. for Preston, and one of the leaders of the "Fair Trade" movement.

Mr. William Fowler, Liberal M.P. for Cambridge.

Mr. H. H. Gibbs.

Mr. W. H. Houldsworth, Tory M.P. for Manchester.

Mr. Jamieson, President of the Scotch Society of Accountants.

Mr. Neville Lubbock, Chairman of the West India Committee.

Mr. Muntz, Tory M.P. for North Warwickshire.

Mr. Jackson, the minority Tory M.P. for Leeds.

Mr. Pearse, of John Elder & Co., Shipbuilders, Glasgow.

Mr. Palgrave, formerly Editor of *The Economist*.

Mr. C. Palmer, large Shipowner, and Liberal M.P. for Durham.

Professor Bonomy Price.

Mr. Story, Liberal M.P. for Sunderland.

Mr. Birtwistle, Secretay to the Weavers' Association.

Mr. Drummond.

Sir Louis Mallet.

Mr. G. H. Murray, of the Treasury, acting as Secretary.

The Commission have addressed a circular to the different Chambers of Commerce, and similar bodies throughout the Kingdom, in which replies are invited to a series of questions, which have been drawn up with a view to obtain information respecting the condition of affairs in the different centres of trade. The following are the questions referred to. The last two questions are intended rather to suggest special points on which to offer observations than to elicit exhaustive replies on all the topics mentioned.

1. What is the area embraced in the district on which your Chamber is prepared to report?

2. What trades or industries are of special importance in that district as measured by (a) the amount of capital invested; (b) the amount of labour employed; (c) the amount of production?

3. In what proportion does the trades and industries of your district find their market at home, or in foreign countries; and, as regards the latter, in which countries chiefly?

4. How has the trade and industry of your districts been affected in the last five years as compared with the periods 1865-70, 1870-75, 1875-80, as regards (a) its volume; (b) its gross value; (c) its net profit; (d) the amount of capital invested; (e) the quantity of labour employed?

5. The phrase "depression in trade" would appear to imply a "normal level" of trade. During what periods in the last twenty years should you say that trade had been (a) at its normal level; (b) above that level; or (c) below it?

6. Judged by a scale constructed in this manner, can the condition of trade and industry, or that of any special trade or industry, in your district at the present time be fairly described as "depressed"?

7. If so, when did the depression begin; when did it reach its lowest point; and what are its most prominent symptoms?

8. Has its progress hitherto been uniform or irregular; and what do you anticipate that its course will be in the immediate future?

9. Have the different trades and industries affected been uniformly affected (a) in time and (b) in intensity?

10. Are there any special circumstances affecting your district to which the existing condition of trade and industry there can be attributed?

11. Should you say that (a) the demand for; (b) the supply of; (c) the return on capital in your district is above or below the average of the last twenty years?

12. Is the rate of wages in relation to service rendered, and to the quantity of the works produced (a) for skilled and (b) for unskilled labour in your district, above or below the average of the last twenty years?

13. What measures could, in your opinion, be adopted to improve the existing condition of trade (a) by legislation and (b) independently of legislation?

14. To what extent do you consider that the present condition of trade and industry in your district has been affected by the operation of any of the following causes: (a) Changes in the relation between capital and labour; (b) changes in the hours of labour; (c) changes in the relations between the producer, the distributor, and the consumer; (d) fall in prices or appreciation of the standard of value; (e) the state of the currency and the

banking laws; (*f*) restriction or inflation of credit; (*g*) over production; (*h*) foreign competition; (*k*) foreign tariffs and bounties; (*l*) incidence of taxation, local or imperial; (*m*) communication with other markets; (*n*) legislation affecting trade; (*o*) legislation affecting land?

The absence of the names, on this Commission, of leading Liberals, of commanding position in the commercial world, such as Mr. Goschen, Mr. W. E. Forster, and Mr. John Slagg, is sufficient to account for the feeling of indifference with which, in very many quarters, this appointment is viewed. It is looked upon as a party move; and the feeling is growing that it will prove to be a farce. Some good, we would fain hope, may result however from the labours of this Commission—which will be a veritable Cave of Adullum for everyone with a grievance to fly to;—the information and evidence they will be able to collect, will show us the utmost that can be said against our Free Trade Principles.

It is a little remarkable that there is only one member of this Commission (*viz.* : Mr. Houldsworth, the Tory member for Manchester,) who directly represents the Cotton Industry, and only one (Mr. Ecroyd, the Tory member for Preston,) who directly represents the Woollen Industry, unless we except Mr. Birtwistle, of the Weavers' Association.

FLORIDA SUGAR.

BY OTTO LUTHY.

ABSTRACT OF REMARKS MADE AT THE MEETING OF THE FRANKLIN
INSTITUTE, PHILADELPHIA, JUNE 17TH, 1883.

It will be of interest to many of the members of the Franklin Institute to hear of the progress made in reclaiming the swamps and overflowed lands of Florida, by the Okeechobee Land Company, generally known as the Disston Enterprise.

I am not in the position now to dwell on the engineering achievements of this great enterprise. Hoping that the chief engineer of that company, Mr. J. M. Kreamer, will favour us sometime with a detailed description of his successful operations, I shall restrict myself to mention, that by the removal of obstructions, by the enlargement of natural waterways, and by the construction of drainage canals, a reduction of several feet of the water level of the Okeechobee Lake has been effected, and so far about 1,125,000 of

acres of heretofore submerged land have been reclaimed, which, by the improved waterways, may now be reached 250 miles inland, by steamboats from the Gulf of Mexico.

The soil of this bottom land is a homogeneous heavy rich loam, largely composed of humus in depths varying from three to ten feet, and well fitted for immediate cultivation.

It is easily understood in these times of continuous agitation of the sugar question, and when the Department of Agriculture in Washington encourages the farmers of all latitudes to produce the sugar the country now imports, that, with the extraordinary favorable condition offered by the Florida climate, the experiments of raising sugar should at once be made upon these fertile bottom lands.

I have the pleasure to-night to exhibit samples of the first sugar and molasses manufactured from cane grown upon these recovered lands, which were sent to me a few days ago, and which indicate a highly encouraging prospect for the sugar industry of that peninsula.

I report the following statements regarding these samples :

The sugar farm, on which the cane was raised, is located near Southport at the foot of Lake Tohopekaliga, about fourteen miles from Kissimmee City. Previous to the operations of the Okeechobee Drainage Company, it had been permanently covered with from two to three feet of water. The canal draining these lands was completed in February, 1883. In January, 1884, active operations were begun in clearing the reclaimed lands. Plowing immediately followed, and between February 14 and 20, 1884, the cane was planted, *one year subsequent to completing the drainage canal.*

The season has been unfavourable—a very dry spring and a very wet fall. The yield is, however, enormous, the stand perfect and the average length of cane fully matured twelve feet, many stalks measuring fifteen feet; average diameter of cane, one-and-three-fourths inches.

The harvesting of the crop was delayed till April 23, 1885, at which time the cane was still in perfect condition and growing *five months* after all cane in Louisiana had been killed by frost.

These samples of sugar and syrup were made from *growing cane* (planted February 20, 1884,) on May 12, 1885. The juice then having a density of 9° B.; the grinding season thus lasting from December to May.

The apparatus for extracting the sugar was of a very imperfect

and primitive kind, involving a loss of at least fifteen per cent. of juice in the "bagasse." No defecation or clarifying was attempted, and no addition made of any kind. With proper apparatus, the yield could be made fully twenty per cent. greater.

Average number of cane stalks per acre	16,000
Gallons of juice obtained per acre	4,000
Gallons of syrup	700
Which, being sold at 40 cents per gallon, brought..	\$280

The cost to clear the land, fence and ditch it, seed cane, planting and cultivation, including all expenses up to grinding, was less than \$100 per acre.

The present crop "ratoons" are remarkably fine, being far superior to the "plant" cane at the same season last year (June, 1884,) while the number of stalks per acre is fully double last season's crop. The crop will be at least seventy-five per cent. heavier than last year.

With a view of ascertaining the value of these new Florida products in the northern markets, I have made an analysis of the samples, which turned out as follows:—

SUGAR.

Crystallizable, or cane sugar proper	96.4
Uncrystallizable, or invert sugar	0.3
Ash	0.5
Moisture	1.7
Organic, non-sugar by difference	1.1

Total..... 100.0

MOLASSES.

Density, 39° Beaumé = 1.362.

One United States gallon (231 cubic inches), weighs 11½ pounds.

Cane sugar

Invert sugar 12.2 „ „

The sugar at once manifests itself as a very high grade raw sugar, and with improved machinery and rational working could be made of such good appearance and fine aromatic flavor, that it would readily sell for direct consumption. As it is, it is worth here about five-and-one-half to six cents, wholesale. The syrup equals the best New Orleans molasses, and would bring, perhaps, from fifty to fifty-three cents per gallon, wholesale, in this city.

These results certainly justify further experiments on the largest practical scale, and we may expect to hear soon of the erection of a large central factory to work up in a rational manner the cane produced by a cluster of sugar farms.

Philadelphia, 220, Church Street, June 17, 1885.

THE FOREIGN BOUNTY SYSTEM.

MEETING OF DELEGATES IN LONDON, SEPTEMBER 19TH, 1885.

A largely attended meeting of delegates connected with the shipping, docks, sugar, and carrying trades of East London, and with the combined workmen's committee of the nine parliamentary divisions of the Tower Hamlets and West Ham, was held on the 19th ult., at the Trafalgar, Leman Street, Whitechapel, for the purpose of considering what action should be taken by East London workmen at the coming general election, with regard to the continuance of the foreign bounty systems of Europe and the United States.—Mr. F. Wigington presided, and said that there was not much time now to spare as regarded decisive action. Mr. Kelly (organising secretary) then reported that deputations of working men had waited upon 27 candidates for the representation of metropolitan constituencies during the past fortnight on the bounty question, and of this number, 21 had declared that they would support a motion in the new Parliament which would efficaciously deal with the State bounties of Europe and America. Upwards of 40,000 men in Great Britain had been robbed of permanent employment through the bounties of Europe and America, and great distress in the East and South-East of London was the result. The workmen in the various divisions of East and South-East London had resolved to vote for no candidate who did not pledge himself to support the system of countervailing the foreign bounty system by the imposition of countervailing duties. The combined committees had arranged for a series of meetings in the Eastern and South-Eastern parts of the metropolis, and a great mass meeting of 5,000 workmen would be held on Saturday, October 10th, at Mile-end.—After discussion, the report was read and adopted, on the motion of Mr. E. Barrett, and seconded by Mr. J. Bradley.—It was further resolved to issue a manifesto, addressed to the industrial classes of London and the provinces, "showing the extent of the robbery of British and Colonial labour" through the continued development of the foreign bounty system.—With a vote of thanks to the chairman, the meeting was closed.

COMMERCIAL ORGANIC ANALYSIS:

A Treatise of the Properties, Proximate Analytical Examination, and modes of Assaying the various Organic Chemicals, and Products, employed in the Arts, Manufactures, Medicines, &c.

BY ALFRED H. ALLEN, F.I.C., F.C.S.

Second Edition, Revised and Enlarged. Vol. I., London, 1885.

We are glad to see a new and revised edition of this very useful work, the first edition of which we noticed in our February number for 1882. The constant progress of discovery must inevitably render such occasional revisions of scientific works absolutely necessary, and we are able to confirm the author's statement that the changes and additions necessitated have been very considerable, so that in fact very few pages of the book remain wholly unaltered. The work is also being re-arranged, and is now divided into three volumes, each of these being devoted to a special class of products, so as at the same time to facilitate reference and to render each volume useful to a special class of enquirers and investigators. Thus Vol. I., the one before us, is devoted to Alcohols, Ethers, Starch, and similar compounds; Vol. II. will treat of Coal-Tar Products, Hydro-carbons in general, Fixed Oils, and Tannins, and Vol. III. will deal with Nitrogenised Organic Substances.

Mr. Allen is of course too well known to need any introduction to the greater part of our readers. The fact that the former edition is now out of print, and that second-hand copies fetch full published price, is perhaps the best recommendation that could be given of the present revised edition. As far as sugar is concerned, the latest discoveries and processes relating to analysis appear to have been incorporated in the volume under review, and the book should form a *vade mecum* for all who are engaged in the analysis of organic bodies for commercial purposes, though some of the methods described are delicate and accurate enough for scientific application.

We would call particular attention to the remarks on page 231, with reference to the influence of variable conditions on the reducing power of sugar solutions. These are especially interesting in view of the dissatisfaction expressed by German sugar exporters with the analyses of sugar in London, conducted by means of Fehling's

solution, and indicating the presence of glucose (*Invertzucker*), while the German chemist, Bodembender, declares that the process adopted in the extraction of some of these sugars must inevitably destroy the substance hitherto known as *Invertzucker*, and suggests that some other non-crystallisable sugar must be present.

We notice one or two slight defects. On page 292, the German equivalent for invert-sugar is given as "*Krümelsucker*," which can scarcely be regarded as accurate. In several cases the references to paragraphs are incorrect, the error being always 10 in excess; thus on page 255, paragraph 681 should be 671; on page 284, paragraph 685 should be 675; on pages 289 and 292, paragraph 680 should be 670. No doubt these errors are incidental to the revision and have escaped alteration.

The author's own suggestions form not the least valuable portion of the work. For instance, on page 255, paragraph 292, he proposes an alternative method for the very important approximate estimation of starch-sugar in admixture with cane-sugar, which appears to us to possess considerable advantage over the other methods which he states are usually employed.

Perhaps we cannot give a better idea of the value of the book than by subjoining a few extracts, the publication of which is sanctioned by the author.

SPECIFIC ROTATORY POWERS OF SUGARS.

The strength of a cane-sugar solution which will produce the same deviation, when examined in a tube 2 decimetres in length, as a plate of quartz 1 millim. in thickness, has been determined by various observers. Clerget estimated it at 16·471 grammes of sucrose in each 100 c.c. of solution. Dubrunfaut reduced the amount to 16·390 grammes, while the weight 16·350 grammes was the result of the investigations of a commission consisting of Pouillet, Barreswil, Schlösing, and Duboseq. The directions now issued with the instrument specify the last-named amount as that to be used in verifying the scale. Recently Girard and De Luynes have given 19·190 grammes of cane-sugar per 100 c.c. as the equivalent of 1 millimetre of quartz. Tollens (*Ber.*, 1877, 1403), in a very elaborate paper, gives 16·337 grammes as the standard amount. The deviation of the D line produced by 1 millim. of quartz is $21^{\circ}40'$, according to Broch, or $21^{\circ}48'$, according to Girard and De Luynes. The mean of these two determinations is $21^{\circ}44' = 21\cdot73$. Employing this figure in the for-

mula for specific rotatory power given in paragraph 59, the value of S_D for cane-sugar in solutions containing about 16 grammes per 100 c.c. may be found as follows:—

$$S_D = \frac{100 \times 21.73^\circ}{2 \times 16.337} = 66.50^\circ$$

As stated already, the concentration of the solution sensibly affects the specific rotation of sugars, and not always in the same direction. Thus, strong solutions of sucrose cause a less deviation than the same amount of sugar would in more dilute solutions, while with dextrose the reverse is the case. On this account recorded values for S must not be interpreted too strictly in cases in which no mention is made of the concentration of the solution. The importance of this point is well shown by the following determinations, by Hesse, of the value of S_D for cane-sugar in solutions of various strengths. (These determinations have recently been disputed by Tollens, who finds a very slight *increase* in the rotatory power of very dilute solutions. *Ber.* xvii. 1751).

Grammes of Sucrose per 100 c.c.	Value of S_D
1	67.95
2	67.39
3	67.05
6	66.67
10	66.50
20	66.45

The exact apparent specific rotary power may be found, for solutions of strengths varying from 1 to 10 grammes of cane-sugar per 100 c.c., by the following formula, in which c represents the number of grammes of sugar in each 100 c.c. of the solution:—

$$S_D = +68.65 - .828c + .115415c^2 - .00541666c^3$$

Beyond a concentration of 10 grammes of sugar per 100 c.c. of the solution, the decrease is pretty regularly .005 for each unit of sugar. Calculated from the above formula, the value of S_D for cane-sugar when $c = 10$ is 66.4948° . Tollens has recently proposed the formula:—

$$S_D = 66.386 + 0.015035c - 0.0003986c^2$$

By this, if $c = 10$, $S_D = 66.4966^\circ$.

Although the apparent specific rotatory power of cane-sugar for the D line may be considered to be accurately ascertained, the same

cannot be said of the value for the transition-tint. This is doubtless due in part to the fact that the transition-tint is not a ray of definite refrangibility, and even differs with different observers.

SPECIFIC GRAVITY OF SACCHARINE SOLUTIONS.

NOTE.—The increase in the density of cane-sugar solutions by inversion has a practical bearing of an unpleasant character, as some brewers have discovered to their cost, the duty on worts being levied on the content of saccharine matter as indicated by the specific gravity. Hence, if, from the presence of traces of acids or ferments the dissolved sugar gradually undergoes inversion, the brewer will be liable to an increased duty. By completely inverting the solution with acid, (making due allowance for the increase of density due to the acid used), calculating the sugar from the density, and deducting 1-20th for increase of gravity due to inversion, the amount of sugar which was present in the wort may be ascertained.

ACTION OF DILUTE ACIDS ON SUGARS.—INVERSION.

Sucrose is most readily and certainly inverted by adding, to a solution containing not more than 25 grammes of the solid per 100 c.c., one-tenth of its bulk of fuming hydrochloric acid, and then heating the liquid to 70° C. for ten or fifteen minutes. Some operators prefer dilute sulphuric to hydrochloric acid, and heat the liquid to boiling point for five or ten minutes.

DETERMINATION OF SUCROSE IN PRESENCE OF GLUCOSE.—

(CLERGET'S PROCESS.)

While the polarimeter is capable of accurately indicating the proportion of cane sugar present in a liquid containing no other optically active substance, its readings may be below the truth, or actually negative, if the liquid contains a notable amount of certain other varieties of sugar, or other active bodies. Hence, in such complex liquids the direct reading of the polarimeter is erroneous, but by operating in a manner first suggested by Clerget, the indications may still be relied on.

The different varieties of glucose are unaffected by heating with dilute acid, while cane-sugar is, by such treatment, converted into a mixture of equal parts of sucro-dextrose or dextro-glucose, and sucro-lævulose or lævo-glucose. The product is called inverted or invert sugar, of which 100 parts are produced by the hydration or "hydrolysis" of 95 parts of cane-sugar. Serious discrepancies exist in the rotatory power of sucro-dextrose as determined by different observers. In certain cases it is even doubtful whether the recorded numbers apply to anhydrous or to crystallised dextrose. Fortunately any doubt as to the true rotatory power of this sugar does not affect the accuracy of ordinary sugar assays.

ANALYSES SHOWING THE GENERAL CHARACTER OF TYPICAL
KINDS OF COMMERCIAL SUGAR.

Description of Sugar.	Sucrose.	Glucose.	Insoluble Matter.	Ash.	Water.	Organic Matter, not Sugar.	Authority.
RAW CANE SUGARS—							
West India.....	94.40	2.2	.1	.2	2.8	.3	W. Wallace.
Dominica	88.30	3.36	....	1.22	4.95	2.17	} Wigner & Harland.
Jamaica	90.40	3.47	....	.36	4.22	1.55	
Porto Rico	87.50	4.84	....	.81	4.25	2.60	
Trinidad.....	88.00	5.14	....	.96	4.23	1.67	
Surinam	86.80	4.31	....	2.28	5.27	1.34	
China	72.50	9.19	....	1.80	6.76	9.75	
Benares	94.50	2.63	....	1.50	.98	.39	
White Java.....	99.20	.20	....	.20	.40	trace.	}
Unclayed Manilla...	82.00	6.79	....	2.00	5.97	3.24	
RAW BEET SUGARS—							
Beet (average of 7)..	93.64	trace.	....	1.67	2.62	2.07	J. Bell.
Beet	89.15	....	....	2.63	4.26	3.96	H. Gill.
Beet	95.70	.30	....	1.60	2.00	.40	W. Wallace.
PALM SUGARS—							
Date	95.40	1.80	1.70	.20	.80	.40	W. Wallace.
East Indian	86.00	2.19	....	2.88	6.04	2.89	W. and H.
SORGHUM SUGARS—							
.....	93.05	.41	....	.68	1.72	4.14	Böckmann.
Hutchison, Kansas..	92.00	4.50	....	1.10	1.50	.90	O. Houck.
REFINED SUGARS—							
Tate's Crystals	99.90	none.	....	trace.	trace.	none.	W. and H.
French pulverized..	99.70	trace.	....	.10	.20	none.	„
Duncan's granulated	99.80	trace.	....	.10	.10	none.	„
Martineau's tablets..	99.80	none.	....	.10	.10	none.	„
Finzel's crystals ..	99.86	none.	none.	.01	.13	none.	A.H. Hassall.
Beet sugar, loaf....	99.10	trace.	....	.15	.25	none.	W. and H.
Beet sugar, crystals.	99.90	none.	....	trace.	trace.	none.	„

A JAM FARM IN KENT.

We are indebted to *The Mark Lane Express* for the following interesting account of the establishment of a Preserve Manufactory, on the spot where the fruit is grown—260 tons of Jam were made in July, and about the same quantity in August—we wish the promoters every success—more Jam, more Sugar:—

At and about Swanley, St. Mary Cray, and the surrounding parts, in addition to the apples, pears, plums, and cherries that have long been grown, strawberry and raspberry cultivation of late years have been largely increased, with the result that prices have been so reduced that after the cost of production is deducted the profits remaining are insufficient. To meet this state of matters one of the largest growers, Mr. Wood, of Woodlands Farm, Crockenhill, Swanley, has this year started an extensive factory adjacent to Swanley Station, so as to be able to convert the fruit he grows into jam, in place of, as hitherto, like other growers, having to dispose of it to the jam-makers. The structure is built of bricks, and is a very good-looking, substantial erection; it was completed during the spring of this year, and the requisite plant put in ready to commence operations when the earliest fruit, strawberries, &c., were ripe. The boiling house is a large, roomy place on the ground floor, with fifteen copper boilers ranged in line on one side. The process is effected by steam, to provide which a sixty horse-power boiler has been put down in a shed adjoining the boiling-house; from this the main pipes conveying the steam are carried along under where the boilers are placed. The arrangement is such that a branch pipe connected with the main can easily be attached to, or detached from, each of the boilers; these branch pipes are provided with taps, so that the volume of steam can be regulated at will. The sugar is first put in the boilers with a little water to liquify it; the steam is then turned on, and in about two minutes it is reduced to a clear, transparent syrup; during this time it is kept stirred, the fruit is then put in, and in a few seconds is boiling furiously; it is kept stirred until boiled sufficiently with a long flat utensil of polished wood, in shape like the paddle of a canoe, with which the attendant on each boiler is provided. When boiled sufficiently it is removed to another big room adjoining, where it is put in the jars; after cooling

it is sent up to the second storey, where making-up and labelling is done. About seventy hands are employed, most of them young women, who do the lighter work of picking the fruit, and making it up. The boiling is done by men, under an experienced foreman. It is quick work all through. Plums were the fruit in hand on the day of my visit; they were gathered that morning, and came to hand covered with their blue bloom, and in fifteen minutes from the time the sugar was put in the boiler the steam was shut off, and the boiling completed. As soon as cool enough the jam was put in the jars, allowed to stand a short time, and then the capsules, made of vegetable parchment, were put on, and tied down as tight as the head of a drum, and the labels denoting the kind of fruit the jars contained were attached; with this the process was complete, and the jam ready for packing, to be sent away the same evening. The packing-shed attached to the main building occupies a large space, admitting of the carts and waggons being loaded and unloaded under cover. Strawberries, raspberries, gooseberries, red currants, black currants, greengages, apricots, damsons, and coloured plums, are each preserved separately. No mixtures of any kind are made, except one of apples and plums and the household jam, which is a mixture of whatever fruits are ripe at the same time. The sugar used is all of the best quality—superfine Dutch crushed and American granulated. The sizes of the jars are 14 lbs., 7 lbs., and 4 lbs., glazed earthenware; 14 lbs. and 7 lbs., tins; 3 lbs., 2 lbs., and 1 lb., glass jars. Jelly of different kinds is put in 1 lb., $\frac{1}{2}$ lb., and $\frac{1}{4}$ lb. glasses. Nothing in its way could be finer than the different kinds of fruit as seen in the glass jars, with much of it showing its natural form, so different from the indescribable “smash” often met with. The jelly is as clear as the “moulds” turned out by a first-class confectioner. A large amount of fruit has been got through—260 tons of jam were made in July, and only something less in August, and the work will be continued until the last of the plums are over. Mr. Wood, besides the Swanley Farm, has two others—Greatness Farm, at Sevenoaks; and Horn Park Farm, Lee. Altogether he has 250 acres devoted to the various kinds of fruit. All the fruit that has been converted into jam and jelly during the summer has been his own growing, except a few plums, and in addition 70 tons of strawberries were sold. Nineteen tons of raspberries were gathered in one day. Even those who have some knowledge of fruit growing will have a difficulty in fully realising the amount of

labour that has to be employed in the gathering alone when such figures as the above are taken into account.

Much is often said, and possibly not without some cause, about the mysterious materials of which some jam is composed, and about the stale, half-rotten state of the fruit when it reaches the makers; but superiority of jam when made, as here, from fruit fresh gathered and virtually grown on the spot, is so obvious as to need no comment. Mr. Wood's undertaking is a move in the right direction, which is to bring the producer and the consumer nearer together.

PULSOMETER ENGINEERING COMPANY, LIMITED.

A Gold Medal has been awarded by the Jurors of the Inventions Division of the International Exhibition, at South Kensington, to the Pulsometer Engineering Company, for their Pulsometer Steam Pump, Deane Pump, and "Thames" Filter.

Engineering, in speaking of their exhibit, says:—Of course, the Pulsometer occupies the place of honour, several sizes being shown, one in section, to illustrate the wonderful simplicity of the arrangement. In order that one of the special features of the arrangement, that is, its capacity for working when merely suspended, may be realised, there is an imitation well with a Pulsometer hung in it by a chain, and throwing great quantities of water. In another example a Pulsometer, lifting 6000 gallons of water an hour, is supplied by steam by a half-inch pipe as a demonstration that the consumption is not excessive. The other pumps at the stand are all named the "Deane," they offer considerable diversity of appearance, but are characterised by the same valve gear. The main valve is moved by two supplementary pistons which receive the steam alternately. This is admitted to them by a smaller valve worked by spindle carrying top-petters, which are struck alternately at each end of the piston travel by an arm on the piston rod. As an additional precaution against stoppage, the smaller valve comes in contact with the main valve before it ends its stroke, unless the latter has already moved under the impulse of the steam. Consequently the main valve is pushed over positively if the usual arrangement fails to act. There are two passages at each end of the cylinder, one for the steam and the other for the exhaust; in the steam passage there is a clack which closes immediately the exhaust commences, and interrupts the

communication. In the other passage there is a screw-down valve, which can be set to give any desired amount of cushion. Among the varieties of this pump exhibited, there is a direct acting horizontal pump for lifts higher than the Pulsometer can deal with, a horizontal pump for large quantities on low lifts, the steam cylinder measuring 12in. by 18in., and the pump cylinder 14in. by 18in.; a double plunger sinking pump, for raising water from narrow wells to a height of 150ft.; a vertical engine to be placed directly over the well, and a duplex pump. The sinking pump was illustrated on page 125 of our thirty-sixth volume, but it is worth while to give a short account of it again, as it is somewhat difficult to understand by mere inspection. The ram is hollow, the cross-section at one end being double of that at the other. Between the two parts is a valve. The large end works in the pump cylinder, and the small end reciprocates on the outside of another cylinder, which is really the bottom length of the rising main. On the upstroke the water above the higher valve is lifted into the main and discharged, while the foot valve opens and water from the suction pipe enters the pump barrel. On the downstroke this water is forced out of the barrel through the upper valve into the smaller part of the hollow plunger, and consequently a portion of it goes forward into the rising main. Hence there is a second delivery at the upper outlet, the column of water being kept in constant forward motion. The pump, which has a cylinder 10in. in diameter by 16in. stroke, hangs in a space 16in. by 28in. It can be readily moved to follow the falling water level, and leaves the well comparatively clear for the workmen. It will thus be seen that this stand comprises an extensive collection of pumping apparatus, which has been carefully designed to meet the many different requirements of a wide circle of users, and that while the needs of contractors and well-sinkers have a large attention, those of the manufacturer are by no means neglected.

THE BALATA INDUSTRY OF BRITISH GUIANA.

The following interesting account of this new industry, taken largely from the Report of Mr. J. S. Jenman, Superintendent of the Botanic Gardens at Georgetown, we copy from a recent number of the *South American Journal*:—

Many causes have retarded the development of the colony, notably, want of population. But the extraordinary growth of the system of

importing population, and thereby labour, is remedying this cause, and will in time, it is hoped, remove it. The system is keeping pace with the progress of the colony, and will continue to do so. Another cause is the entire devotion to the cultivation of sugar. The Guianese, from the planter to the negro labourer, are, practically speaking, monomaniacs. All their eggs are in one basket. The recent severe depression in the sugar market has forcibly illustrated the danger of this policy. To say that the colony has been brought to the verge of ruin is an exaggeration. Ruin has, however, stared the colony in the face, and may in the future accomplish what it has recently threatened, if the colony does not take the lesson to heart and develop its other resources. Herein is ample room for the employment of British capital and the exercise of British enterprise, energy, and industry. As our readers are aware, the cultivation of sugar is confined to the mud flats of the sea coast and along the banks of the rivers. The forest interior, save by a comparatively few wood cutters, is unutilized, its wealth and resources undeveloped. It is to one of the products of the forest—balata—we would now desire to draw attention. Balata is the milk exuding from the bullet-tree (*minnusops balata*) upon the bark being cut, and when dried has a chemical composition, according to Dr. Hugo Nutter, F.R.S., probably identical with that of gutta percha and of caoutchouc. Intrinsically it is the most valuable substance of the kind known, but the fact of it not being placed in the market in sufficient quantities precludes its use. In Dutch Guiana an American company has obtained a large grant of forest, and is obtaining some 50 cents per pound for balata, with the assurance that the price will be considerably increased if a permanently sufficient supply is forthcoming.

British Guiana affords excellent facilities for the pursuit of the industry. About 100 miles of the low alluvial forest region of Berbice, on either side of the Canje river, is thickly studded with belts of bullet-tree. The hardy and plucky dutchmen pushed up the Canje and worked estates there, but these, after emancipation, fell into the hands of negro communities, who, in keeping with their habits, let the estates ruinate, but who still inhabit the scattered villages along the banks of the river. It is these people, aided also by negroes who come under contract from the mouth of the river, who collect the balata. A quarter of a century since the industry did not exist. Scarcity of india rubber led to the value of the milky secretion of the bullet-tree becoming known. Messrs. Silver and Co., of

London, were among the first to recognise its utility, and as with all new products, it has experienced varied fortunes. That it has not won its way in the market is due to the fact that it has not been produced sufficiently. It is with the hope of stimulating inquiry into the industry that we subjoin a few particulars gleaned from an exhaustive report upon the subject to the Government of British Guiana by Mr. G. S. Jenman, the accomplished botanist to the Government. The bullet-tree is a large forest tree, reaching to a height of 120 feet, with a trunk 60 to 70 feet long and 4 to 5 feet in diameter, said to range from Jamaica and Trinidad to Venezuela and French Guiana. It is allied to the gutta percha trees of the Malayan Archipelego, from whence comes the present supply of gutta percha.

The bark is about half an inch in thickness, and bears deep parallel fissures about an inch apart, and with longitudinal fissures. The wood has a red tinge, and is one of the hardest and densest the forest yields, and squares up to 3 feet 6 inches. Says Mr. Jenman:—

“The trees are more plentiful in the depths of the forest than near the rivers, hence the creeks form arteries to the balata grounds. Several of the creeks on both banks of the Canje are instances of this. The wood-cutters regard the bullet-tree as inexhaustible; in the interior of the forest it exists in profusion, and abundance lies beyond the reach of the balata collectors as they at present conduct their operations. As the trees near at hand become exhausted they will no doubt alter their habits, and make clearings as drying places in the heart of the forest, but now they are under the obligation of returning to the settlements on the creeks with the milk they have collected to dry. Under this necessity they can at most only penetrate about two days’ journey, but so far as they have explored they report there is no diminution in the abundance of the trees. The forest at this depth of course has never been touched by wood-cutters, as for convenience in getting their timber out, they have to confine their operations to the banks of the river and creeks, rarely going in more than a mile or two.”

Many of the giant bullet-trees, Mr. Jenman does not doubt, have braved the vicissitudes of fortune for hundreds of years, nor should he regard it as improbable that some even saw the birth of the Christian era. He himself shall describe the manner of collecting the balata:—

“I have mentioned that the river inhabitants are of slave descent.

They are consequently negroes. The collectors who come from other quarters are of the same race. They are typically hardy well-built fellows, capable of heavy work and possessing great powers of endurance. As they meet in the early morning while the settlement was still thinly enshrouded in the mist which the sun just rising over the forest was beginning to dissipate, equipped for their work, I had frequent opportunity to note at one and the same time their physique, dress, and the tools and appliances required in the trade, as well as in my intercourse with them in the forest. Their garments are few, and if they afford little protection from inclement weather, they are adapted not to impede their movements in the forest. They consist usually of a cap that fits the skull and forehead tightly; a thin singlet over the body, also skin-tight¹; and a pair of Osnaburg trousers that reach just below the knees. The feet are bare. Around the waist a belt is worn which supports the trousers, in which a sailor's sheath-knife is fixed, naked; and dangling by a short piece of string is a bamboo tube about 4 inches long and an inch thick, plugged and inverted to keep out rain, containing matches. In the right hand a cutlass is held by the handle, with which the holder, as he stands waiting, chops idly at the nearest stump or tree.* Over the left shoulder is an axe, on one end of the handle of which is strung two or three goobees in which the balata milk is carried home from the forest, and on the other end the coil of calabash basins used in collecting it. If breakfast is taken, it is carried in a covered tin saucepan which hangs by the curved iron-wire handle in one other hand. So equipped the collectors start for their day's work, and it is surprising with what rapidity and care, in spite of their very cumbersome impedimenta, they thread their way through the thick forest when the ground is at all fairly good for walking. The axe is required for felling trees, and the cutlass for making the channels in the bark by which the milk is obtained. The cutlass is a large instrument twenty-two inches long, curved and rather wider at the outer end, where it is about three inches deep. The axe is the ordinary American kind used by woodcutters. The goobees are natural bottles, the size and shape of an ox bladder, holding from one or two gallons each. They are produced by a gourd—*Lagenaria vulgaris*—which grows in the sand at most Indian settlements, much

*At every house and settlement on the river every tree near at hand—even cocoanuts, coquerites and other palms—has been chipped in idle moments, or by novices for practice, in the manner the bullet trees are bled.

like pumpkin vine. A hole is cut, about two inches in diameter, near the scar where the stem was connected to the fruit, and the contents of seed and pith scraped out by inserting and twisting a piece of stick or other sharp instrument. This leaves a strong hard shell which for its protection and as a means to affix a handle, is then laced in an open network of mamourie—the split stems of a climbing *Carludorica*—to which a rather long curved handle of the same material is attached that enables it to be carried over the shoulder of the collector. On the return journey they are balanced by being hung before and behind, usually two each way, and the rapid traveller has to be careful that he does not slip, make a false step into one of the coquerite pit-falls, or trip into collision with a tree, for they are easily cracked by a blow thus given, and the milk at once escapes. When filled the orifice is stopped by a cork cut from the bullet-tree bark, round the edges of which clay is rubbed to prevent any leakage by jolting on the way. The calabash—*crescente cujete*—basins are prepared much in the same way, only in their case the fruit is split in two, and the pith and seeds then removed. In being divided some of them crack and break unequally, but all the pieces large enough to hold any milk at all worth considering are saved for use. For carrying, the calabashes are threaded together by a hole bored just under the rim; but sometimes they are taken in a bag.

These are generally the only appliances required in the forest for collecting, but in some cases ladders are used for reaching higher up the trunks of the trees that are bled standing than the collectors could reach from the ground. These are made on the spot when required. They are very rough and temporary constructions, consisting of two poles from ten to twenty, or rarely thirty feet long, connected by two or more crossbars, the steps being tied on or made of bush rope laced to and fro. From their rickety character accidents sometimes occur in using them, and sprained limbs or ribs are the results. For drying the balata at the settlements shallow trays are employed. They are made of wood, are four inches deep, 18 to 24 inches wide and 2 to 4 feet long. The joints are sealed to prevent leakage by drying a film of balata over them. Oil, grease, or soap is then rubbed over the surface to prevent the milk sticking as it dries. At stations where balata is largely purchased special drying sheds are erected. These are open-roofed thatched buildings, with open sides. A floor, about 2 or 3 feet from the ground, is made

of crossbeams upon which the trays stand. Down the middle a passage is left so that each tray can be conveniently reached for taking off the sheets of balata as they dry either from the inside or outside of the building. Where a smaller quantity is dried, the trays are arranged around the open sides of the dwelling-houses, kitchens, &c., just inside the eaves. Two or three feet above the trays, horizontal wooden bars or lines of bush rope are stretched, on which the sheets of balata are hung to drip as they are taken out of the trays, when the underside is still in a milky fluid state. When the milk accumulates faster than the means of drying will accommodate it, barrels are used to receive it till the trays become vacant."

At present the collectors often adulterate the balata by the addition of water and other substitutes to increase its weight. What is really wanted is British capital and British supervision. By this means the industry could be systemised, and a sufficient supply of balata placed in the market to ensure its use. That it is a lucrative industry of the future, there can be little doubt. Who will lead the way in making it a lucrative industry of the present?

COLONIAL POSSESSIONS.

The area of the United Kingdom is 120,964 square miles, and for every mile of her own area she has 65 square miles of Colony. Holland has 54, Portugal 20, Denmark 6.30, France 1.90, and Spain 0.86 square miles. The area of the British Colonies is nearly 8,000,000 square miles, or not quite the area of the Russian Empire, including Siberia and Central Asia; but if the area of the native feudatory States in India, over which Great Britain exercises as much control as Russia does over much of her own territory, be added, then the area of the British Empire is greater than that of the Russian Empire by some 200,000 square miles, and is equal to about one-sixth of the entire surface of the earth.

THE WAY OUT.

By W. EATHORNE GILL.

The millions of pounds sterling distributed over our possessions in the West Indies are stagnant, as a result of competition by beet sugar aided by the jealousy of our commerce by foreign Governments, who supply the profits of beet sugar. Those who were deeply interested vigilantly watched the progress of this competition, and sought every opportunity for possible political rectification, leaving the manufacturing interest to the technically qualified.

It is many years since Lord Palmerston assured those who waited on him that he had exhausted diplomacy in efforts to induce certain Governments to withhold those extravagant bounties from their exporters of beet sugar—that he had done everything in his power short of declaring war; which he could not do.

Every Minister since then has been similarly applied to, with a similar result. We are told that we do as we think proper with our money, and foreigners lay claim to a similar privilege; so there is but faint hopes of redress from those whose interests perpetuate the mischief.

It may be possible, after all, to rise from this attitude of solicitation to one of satisfied ability to overcome the difficulty without extraneous assistance. There remains open a sufficient opportunity for cane sugar to command the market of the world, if we but consent to correct a gross error in the manufacture of cane sugar, by which error as much sugar is lost as is sold. This error may have been consistent with the ignorance of its originators in the dark “time of slavery,” but can have no claim on gratitude to be perpetuated. By avoiding such an enormous loss of property we realise a substantial gain, even when we limit the probability, in this argument, to 50 per cent., which every intelligent manager can prove to his perfect satisfaction, *ex. gra.*

No one who has studied the subject under consideration can look on “the copper wall” in the boiling house but with disgust and horror. Its temperature is, in most instances, seven times more intense than the usual temperature of the working boiler of the steam engine, whilst it is well known that more or less sugar is decomposed, is lost, as its solution—the syrups—rise above 140° F. Those able chemists who manage the manufacture of beet sugar are well aware of this fact.

As a result of accepting this 140° for their guide, they get as much sugar from beet juice as is commonly got from a like quantity of cane juice, although cane juice contains nearly double the quantity of sugar that the beet juice contains. In a word, temperature is the great secret of their success, and about which they are very particular.

It were an injustice to suppose that those who deservedly became managers of sugar estates could be content with the knowledge of such a serious loss of sugar. Improvements suggested from within, and others from without have been degraded to the common level by the temperature of the "copper-wall," to which all were compelled to submit as to an absolutely necessary routine. Failures have not been likely to be attributed to the copper-wall by they who venerate the memory of those originators of that miserable treatment which was begotten in the ignorance and entanglement of slavery. The word failure has been calmly fastened on the novel victim of temperature in preference. Attempts were begun in the right direction when the vacuum-pan was introduced with its desirable temperature to the manufacture of sugar. Whenever that desirable temperature (140° F.) pervades the whole process, we shall know that the destroyer is destroyed.

Of course the vacuum-pan cannot restore the sugar which the temperature of the copper-wall destroyed. As a consequence, we still have the short common product. We may get the larger product when those "frying-pans," as that celebrated chemist, Dr. Ure, in terms of condemnation referred to the pans on the copper-wall, shall be discarded, when the tentative number of the vacuum-pans are become sufficient in number to utilise all the cane-juice, or else open evaporating-pans, and the uniform temperature already indicated obtained and preserved whilst allowing the syrups to finish at 170° or 175° F. Then will first-class cane-sugar again command the market with a desirable margin from the larger product, where beet-sugar cannot compete, and gladness be diffused among the inhabitants of our West Indies, and also among the possessors of estates there.

Every intelligent manager of a sugar estate can corroborate these things practically without expense, and without opinion or further instructions to find "the way out" of the thralldom which threatens. The avoidance of the loss of sugar in some 70 gallons of molasses saturated with sugar with every hogshead of sugar, at present produced, will presently follow.

SUGAR INDUSTRY OF RUSSIA 1883-84.

Report compiled and translated by the United States' Acting Consul-General Swann.

This industry is mostly confined to limited areas in the southwestern, Little Russian, and Prevestland provinces of the Empire, and from the total number of sugar works in successful operation during the year 1883 the distribution was as follows :

In the southwestern provinces there were 128 establishments in operation, of which the greater number (68) were in the government of Kieff, and 49 in Podolsk ; in Little Russia 38, in the government of Kharkoff 22, and in the Prevestland provinces 42. In nine other governments 36 establishments were in active operation, of which latter number 14 were in the government of Koursk.

The beet-root plantations under cultivation in 1883—and in connection with this sugar industry—equalled 735,000 acres, being an excess of 102,051 acres over the area under cultivation in 1882. Of this total 302,942 acres belonged to the sugar companies, and 432,058 acres to planters.

During the year 1883 the sugar works consumed 22,473,096 berkovets of beets (1 berkovet Russian equals 360 English pounds),* of which quantity 22,172,777 berkovets were accounted for as follows :

Sugar works located in—	1883	1882
	Berkovets.	Berkovits.
Southwest governments.....	12,511,451	†663,716
Prevestland provinces.....	3,516,996	†972,365
Other governments.....	6,484,649	†888,651

Results obtained from these operations were as follows, given in poods (1 pood equals 36 pounds English) :—

	Poods.
Best sugars.....	1,553,295
White and moist.....	14,422,554
Yellow moist.....	9,306
Refined molasses.....	1,249
Being an excess of 894,104 poods over the workings of the former year 1882, although in the manufacture of best sugar there was a decrease in the output of 528,916 poods as compared with 1882.	

* About 6 Berkovets to an English Ton.

† Decrease.

‡ Increase.

From the total quantities of best refined sugars and lower grades, the manufacture has been distributed as follows for 1883 :

REFINED BEST.		LOWER GRADES.	
	Poods.		Poods.
Warsaw	717,426	Kieff	4,991,283
Keiff	264,176	Podolsk.....	2,924,499
Podolsk	252,179	Kharkoff	2,230,281

The total number of employès engaged in the sugar industry at the manufactories, exclusive of beet-root cultivation, was, in 1883, 94,580 persons; of which number 73,334 were male labourers, 13,869 were female labourers, and 7,377 were children.

Notwithstanding low prices in connection with this industry, the trade returns during the past year 1884 have been satisfactory, the exports being as follows :—

Refined Sugars.	1884.	1883.
	Poods.	Poods.
Baltic Sea exports	4,830	.....
Black and Azoff Sea exports	28,990	8,091
Land transit.....	39	22
	33,859	8,113

The profits derived by the companies engaged in this industry are not so great for the year 1884 as in 1883, and in the greater number of instances the profits and bonuses at the disposal of the shareholders in the sugar undertakings of Russia were much diminished as will be seen from the following details collected from the "Kierlanui," a journal devoted to this industry.

The dividends of the sugar refinery "Lorodok" for the year 1884 was 20 per cent. as compared with 25 per cent. gain in 1883. The refinery "Iaropowitch" gave 15 per cent. The "Keiff Sugar Refining Company" declared a dividend of 8 per cent. as compared with 10 per cent. in 1883. The "Kalinsky" Sugar Works, "gave a dividend of 20 per cent., as compared with profits exceeding 40 per cent. in 1883, and the Romanoffsky Refinery gave 15 per cent. for the late year's working.

Other sugar works and refineries gave results not less satisfactory to their shareholders, though, as already intimated, the dividends were not so great as in 1883.

JAMES V. R. SWANN,
Consul General.

United States Consulate-General,
St. Petersburg, May 12, 1885.

PROSPECTUS OF THE ELECTRIC SUGAR REFINING COMPANY.

OFFICE:—LIVERPOOL LONDON AND GLOBE BUILDINGS, 47, WILLIAM
STREET, NEW YORK.

CAPITAL STOCK:—10,000 Shares of 100 dollars each, or one million
dollars, fully paid and unassessable.

Organised under the laws of the State of New York.

R. N. Woodworth, president.

Henry Belden, of the National Park Bank of New York, Secretary.

The company owns the invention of Henry C. Friend, of New York, and its exclusive use for the whole world.

This invention is an entirely new process of refining sugars. It is dry throughout, dispensing altogether with boiling and the use of bone-black. No syrup whatever is produced, but the whole product is hard sugar of nearly, if not quite absolute purity, namely 100 per cent., cane-sugar, as per analysis.

A principal feature of the process is the use of electricity, concerning which the inventor claims he has discovered a new manner of producing it at a nominal cost. He claims, and has proved by demonstrations many times repeated, the following points:—

(The demonstrations he has made have been with parcels of sugar from 10lbs. in weight up to over 7,000lbs., and the qualities of the raw sugars refined have been various, including beet-root, second quality, Java stroops, and such low grades.)

- 1.—That raw sugar of the lowest grade can be converted into refined sugar of the highest grade, as easily, and at the same cost, as raw sugar of the highest grade.
- 2.—That the process of conversion will not take in point of time more than four hours, that is to say, from the time the machinery is set in motion, the refined sugar is produced within four hours, and the production once commenced, the output of the refined sugar is continuous, so long as the raw material is supplied.
- 3.—That the cost of the process will not exceed eighty cents per ton, this being the price arranged by contract with Professor Friend, to the performance of which he pledges all his interest in the company.

- 4.—That the loss in weight will not exceed one per cent. of the whole saccharine matter, whether in the condition of cane sugar or glucose, which may be in the raw sugar.
- 5.—That the product, upon analysis, will show not less than 99·50 per cent. of pure sugar.
- 6.—That any description of refined sugar can be produced from the finest powdered up to and including cut and pressed loaf.
- 7.—That the profit in the working of this process will be not less than four pounds per ton of 2,240lbs.
- 8.—That the cost of the machinery required to produce at the rate of four thousand barrels of refined sugar per day of twenty-four working hours, together with the power requisite to run the machinery, and all the attendant apparatus for handling it, up to the point of its being put into barrels, and the fitting of a suitable building to receive and work the machinery will not exceed £20,000.

REPORTED CRUELITIES IN THE HAWAIIAN ISLANDS.

The San Francisco correspondent of the *New York Tribune* reports that well-authenticated accounts of horrible cruelty to Japanese labourers on the Sandwich Islands have been received. It appears that great efforts have been made by the Hawaiian Government to induce Japanese immigration for sugar plantations. Sixty-two persons were sent to plantations in Maui, and their treatment rivals anything told by Abolitionists of inhuman practices in the Southern States before the war. One man, too ill to work, was arrested, marched thirteen miles to prison, and kicked and flogged on the road, dying from the effects of the brutal treatment. The Government was notified, and tried to smooth over matters, but was unsuccessful. Then the Japanese Commissioner was informed, and investigations set on foot revealed a terrible state of affairs—little shelter, long hours of labour, food fit only for hogs, and systematic beating and ill-treatment. It is well known that the Japanese are a most inoffensive race, and give no trouble when treated with ordinary decency. These labourers were immediately removed from the plantation. Out of sixty-two, five died from brutality, and twelve were in the hospital from the same cause. This is said to be only a sample case of similar practices.

NOTES ON BOOKS.

FURTHER REMARKS ON THE ROOTS OF THE SUGAR CANE. By H. Ling Roth. J. Bale & Sons, London, 1885.

This little pamphlet is a reprint from *Timehri* for June, 1885, and a continuation of a paper by the author, read before the Royal Society of New South Wales in 1881.

In the present pamphlet, Mr. Roth gives us the results of an experiment made on October 2, 1883, at Mackay, Queensland, after spring rains, when the soil was moist and warm to the touch, with two pieces of Rose Bamboo sugar cane, in two separate boxes.

No. 1 was planted three inches deep in the soil, No. 2 seven inches deep, both at the usual angle, and otherwise in the manner commonly followed by planters. The shoot of No. 1 appeared above the ground on the 20th of October, and that of No. 2 (the deeper planted) on the 25th of October. As usual, in both cases the soil was slightly raised by the pushing shoot shortly before any appearance of the green above ground. On the 2nd of November, both plants were carefully taken out: the boxes were put in a large butt of water, the sides knocked off, and by gently shaking the plants the soil was got rid of. An after examination of the water and soil showed that none of the roots had been dis severed. The plants were kept in water for 24 hours, to enable the roots to swell, and then photographed.

Mr. Roth gives two illustrations carefully drawn from the photographs; also a meteorological table, showing the degree of atmospheric moisture at 8 a.m., mean shade temperature, and the rainfall in inches, from October 2nd to November 2nd, 1883; the weather would appear to have been very favourable for their growth.

When taken up, the shoot of No. 1 was eighteen inches long, measuring from its point of departure from the parent cane. Besides numerous fine roots it had four fleshy roots, the longest of which was nearly thirteen inches in length, while the others were less than two inches long. These fleshy roots appeared to spring from the point of growth of the shoot on the parent cane and certainly had not come out of any of the starry points on the node.

The shoot of No. 2 was twelve inches long from its point of departure from the parent cane. This shoot was not so developed, nor were the roots quite so numerous or grown to the same length as those of No. 1. There were however seven distinct fleshy roots, apparently also growing out of the bottom of the shoot; three of these averaged six inches in length, the others being much smaller. The fleshy roots are brittle and have a long tube

running down the centre; occasionally they are pointed at the tip, at other times they are blunt. The surface is rough, and adhering grains of sand are distinctly visible without the aid of a lens.

When these fleshy roots are found deep in the ground, that is to say when they belong to old canes, the tips only are succulent, the connecting portion being more or less shrivelled, and lateral smaller fleshy roots are thrown out at right angles at the tips. For its successful growth the cane requires a large amount of moisture, and it is very probable that these roots are thrown out at a period of its growth when the moisture contained in the parent plant is becoming exhausted. When plant-cane is put into moist soil it appears to swell, probably on account of the moisture it absorbs, and it does not shrink until the period of its function as a reservoir has ceased and decomposition sets in. On the other hand when plant-cane is put into dry soil the cause of the slowness of its growth (or rather the long dormant state) is due to the absorption of the moisture in the plant by the soil. Under ordinarily favourable conditions the functions of the fleshy roots would probably be to supply the plant with moisture.

Since my return to England I have hunted through many botanical works and sugar-planter's handbooks, but have not been able to discover any reference to these fleshy roots or even to cane-roots in general. Mr. Marshall Ward, of Owens College, Manchester, very kindly examined these roots for me and says:—"These roots presents no special difference from the other roots, being anatomically and histologically similar, but of course the thicker and older roots have greater quantities of tissue. Being so similar in structure, the probability is that the two varieties of roots have similar functions." The experiments however show that the root development of the cane is very great; they show also that when cane is planted deeply under ordinary circumstances more time is necessary for the shoot to appear above ground; but that in the meanwhile the roots are not idle, for the fleshy ones, which in all probability form the mainstay of the future stool, develop very freely.

. ONCE A MONTH: A Magazine for Australia. Edited by Peter Mercer, D.D., June, 1885. Published by W. Inglis & Co., Melbourne and Dunedin.

This Illustrated Australian Monthly, both as regards matter and get up is on a par with our higher class magazines. Besides the usual amount of fiction, there are in the number before us several papers of special interest to Australians, and those interested in this great and growing Colony. "Adventures of a Pioneer," form No. 11 of a series of papers by W. Lockhart Morton, and is upon New South Wales. In it he relates having met with an animal which was unknown to him. He says, "Throughout the Darling

country, old and new burrows exist, the origin of which appear to be generally unknown. A round area, from five to ten yards in diameter, has been so burrowed, the excavated material so heaped up, that it is considerably higher than the general surface, whilst numerous drives descend at a high angle to the chambers below. One evening our camp was near one, and we wished to find out by what animal such burrows are made. By lying down at sunset, with an ear to the ground, a strange commotion was heard below, indicating a large number of animals, some running about, and others uttering a low grunt. Retiring to a convenient distance to allow the inhabitants to come out, one emerged from a hole, before it was quite dark, and was instantly shot. It was an animal I had never seen before. It was larger than a rabbit; reddish brown in colour; head round with blunt nose; excessively short, but broad ears, with round tips; eyes large—for night work; fore-legs very short, but excessively strong, and feet armed with strong bent claws, made expressly for burrowing; hind legs enormously long; and tail long and smooth. It was a marsupial. I have no doubt its either the Betu, or Yelta, or the Blacks—I think the former. As it is a nocturnal animal, it is never seen by day. Judging from the full description of its hind legs, it must jump like the Kangaroo, as its balancing tail also indicates, whilst its motion must be extremely swift."

SOME RESULTS OF THE CAMPAIGN 1884-85 IN GERMANY.

	£
The Harsum Sugar Company	shows a loss of 354
The Königslütter Sugar Company	„ 12,300
The Marienwerder Sugar Company	„ 1,286
The Altenau of Schoppenstedt Sugar Company ..	„ 7,655
The Riesenbergr Sugar Company	„ 3,565
The Gross Zünder Sugar Company	„ 1,695
The New Schönsee Sugar Company	„ 2,995
The Mewe Sugar Company	„ 5,528,
which includes a Dr. balance from 1883-84.	
The Tiegenhof, formerly Rühland & Co., has decided not to pay any dividend.	
The Rosten Sugar Company	shows a gain of 18s.
The Culmsee Sugar Company	„ £482,
against £32,787 in 1883-84.	
The Vechelde Sugar Company	„ £785
The Transtadt Sugar Company declares a dividend of 10 per cent.	
The Unislaw Sugar Company	„ „ 5 „
The Alt Janer Sugar Company	„ „ 14 „

MONTHLY LIST OF PATENTS.

Communicated by Mr. W. P. THOMPSON, C.E., M.S.C.I.,
Fel.Inst. P.A., Patent Agent, 6, Lord Street, Liverpool; and
323, High Holborn, London, W.C.

ENGLISH.

APPLICATIONS.

9758. H. J. HADDAN, London. (Communicated by A. Z. Champy, N. G. A. Champy, and L. P. G. Champy, Belgium.) *Method and apparatus for purifying, separating, or decomposing liquids by means of electrolysis.* 17th August, 1885.

10110. ARTHUR C. HENDERSON, London. (Communicated by Gabriel Durozad, France.) *An improved process of manufacturing sugar from amy-laceous and cellulose matters.* 26th August, 1885.

10143. JAMES A. DRAKE and RICHARD MUIRHEAD, London. *Improvements in and connected with filter presses.* 27th August, 1885.

10169. B. H. REMMERS and J. WILLIAMSON, Glasgow. *Improved means for facilitating the removal of cakes or sludge from filter presses.* 27th August, 1885.

10172. P. JENSON, London. (Communicated by M. C. P. Barbe, Holland.) *Improvements in the manufacture of refined sugar, and in apparatus therefor.* 27th August, 1885.

10642. E. EDWARDS, London. (Communicated by Emil Rothe, Germany.) *Improvements in centrifugal machines.* 8th September, 1885.

10836. JAMES R. WOODBURN, St. John's, New Brunswick. *Pulverizing sugar and other friable substances to an impalpable powder, called "Woodburn's pulverizer."* 12th September, 1885.

ABRIDGMENTS.

323254. AMOS M. BAILEY, Middle Branch, Ohio. *Process of purifying maple sugar.* 28th July, 1885. The inventor claims mixing with the maple syrup, in about the proportions of one thousand pounds of syrup, two gallons of milk, two dozen of eggs well beaten, and applying heat to bring the mass to a boiling point; second, to the heated mass adding about twenty-five pounds glucose, one half-pound baking soda, one ounce of alum, keeping the mass about at the boiling point, stirring and skimming so long as impurities rise to the surface.

323694. EUGEN LANGEN, Cologne, Germany. *Method of and apparatus for treating semi-liquid substances with purifying or other liquids.* August 4th, 1885. The semi-liquid sugar is passed from a hopper into one end of a series of equal parallel perforated rollers in a horizontal plane. Between each roller and the next is a scraper delivering from the one roller to the

next, and filling the space between the rollers. The rollers are geared to all turn at the same speed and in the same direction. Each roller is partially submerged in a trough. The water or pure liquor is sprayed on to the sugar between the two last rollers, and the liquor falling through the perforations in the last roller into its trough is pumped out and sprayed on to the space between the last but two and the last but three rollers, the liquor from the last but one trough on to the third last space between the rollers, and so on in methodical series.

13763. FRANÇAIS A. BONNEPIN. *Improvements in apparatus for cutting up sugar canes, sorghum, maize, or other vegetable substances.* 17th October, 1884. A series of circular saws are mounted eccentrically on a revolving shaft, the stuff to be comminuted is passed under the saws in a cradle, through the bars of which the saws work, a series of forks between the saws extract the sawn material.

321746. G. M. NEWHALL, Philadelphia. *Apparatus for mixing, heating, and drying sugar, &c.* July 7th, 1885. The invention is especially adapted for mixing raw sugar, or for drying sugar after the refining process. It consists essentially of a horizontal drum, revolving on rollers, and provided if necessary with a steam jacket, having transverse blades in its interior, so disposed as to impel the contents towards the exit. If required, the contents of the drum may be discharged into a second mixing apparatus provided with a horizontal rotating shaft furnished with blades or paddles.

325349. L. LAFRANC, of Tracey-le-Val, France. *Process of extracting sugar from juices, &c.* September 1st, 1885. The ordinary process for separating sugar from raw juice, &c., by combining it with lime to form tribasic saccharate is only advantageous with comparatively concentrated sugar solutions. The improved process consists essentially in adding to the saccharine liquid more than sufficient milk of lime and quicklime to produce a soluble saccharate of lime, filtering the solution to remove excess of lime, heating the solution to about 100° Centigrade, returning to the solution the lime previously removed by filtration, refiltering, to separate the tribasic saccharate of lime from the mother liquor, then adding quicklime to the resulting mother liquors, filtering the mixture to remove the excess of lime, adding to the filtered liquid, first, a salt of lime in sufficient quantity to form tribasic saccharate of lime, and afterwards an alkaline base to transform the remaining sugar into tribasic saccharate of lime, and finally filtering the liquor from the saccharate.

BELGIAN.

ABRIDGMENTS.

63762. F. RASMUS, Brussels. *Improvements in centrifugal machines for cutting beet root.* 5th January, 1884. The inventor claims as new in machines cutting by means of centrifugal force: First, a revolving conoidal disc, provided with arms of such a curve that in consequence of the centri-

fugal force the roots are forced lengthways against the periphery of the cylinder furnished with stationary knives. Second, the combination of the hopper with the rotation disc or its arms, for the purpose of preventing the roots from rubbing against one another in their passage from one to the other, thus securing a free passage for them towards the knives

63777. J. J. LALANDE, Brussels. *Improvements in the process and apparatus for extracting the sugar from beet root.* 7th January, 1884. The invention consists: First, in an improved method for effecting simultaneously the maceration of the beet root and the filtering of the juice obtained by this maceration. Second, in the general arrangement of apparatus for the carrying out of this process.

63786. L. CUISINIER, Brussels. *Improvement in the combined processes for the manufacture of glucose and its compounds, by the simultaneous employment of malt and acids.* The inventor claims a combined process for the manufacture of sugar from starchy matters in general by the simultaneous employment of acids and of malt, manufactured from any cereal, using all or part of the known and approved processes based on the manufacture of glucose, either with acids or with malt.

63864. J. H. REINHARDT, Saint Jasse-ten-Noode. *Improvements in the process for effecting on the industrial scale, the drying of the diffusion residues of sugar refineries.* 17th January, 1884. The inventor claims especially the employment of graters for breaking up the cells of the spent husks for the purpose of facilitating the pressing of them by continuous or other presses. For this purpose he claims the employment of rasps, either centrifugal, or friction or toothed wheeled drums, as well as mills or cylinders, either smooth or furnished with teeth.

64079. J. J. LALANDE, Brussels. *Improvements in the application to the sugar cane of the process and apparatus for extracting sugar from beetroot.* 7th February, 1884. The cane, tied in bundles, is placed in a cutting machine, and cut into small pieces about ten centimetres long. These pieces are then conveyed to a chopping apparatus such as is used for beetroot, and reduced to a pulp, resembling the wood pulp used in manufacturing paper. By this means the woody fibre is so subdivided that the dissolving action of water can affect every part of it. This cane pulp is treated like grated beetroot pulp—that is to say, placed in the macerating filters in weak juice, which becomes enriched by the process of filtering through the mass. The pulp is then further exhausted by being thrown into hot or cold water to form a magma for further use. The weak juice so obtained may be used as a macerating bath for new charges of cane pulp, and the solid part or bagasse can be used as fuel, or in other ways.

64104. E. LANGEN, Brussels. *Improvements in drying and draining sugar by currents of hot and cold air.* 9th February, 1884. The inventor claims

an apparatus for drying or draining, in which the substance dried is cooled before it is removed from the apparatus by means of a current of cold air conveyed by pipes arranged round its orifice.

64110. E. A. BARBET, Brussels. *Improvements in centrifugal root cutters.* 9th February, 1884. The inventor claims specially the method of cutting the beetroots lengthways; the mode of fixing the boxes by means of lugs and staples, without using nuts or screws; and the mode of fixing the boxes by means of movable hoops, or a system of bolts.

64113. K. TROBACH, Brussels. *Improvements in apparatus for and process of extracting sugar direct from raw saccharine matter.* 9th February, 1884. The invention relates to a new process of extracting sugar from raw saccharine matter, and consists essentially in exposing the substances, reduced to small pieces, such as beetroot cut in slices or grated, bruised sugar cane, etc., to vapour of alcohol, or heated alcohol, for the purpose of dehydrating it, the vapour arising from the alcohol carrying off with it the water contained in the raw substance.

64196. F. KLEEMAN, Brussels. *Improvements in purifying sugar juice, syrup, and other liquids by lignite or peat.* 18th February, 1884. Great difficulty has hitherto been found in the extraction of gummy or mucilaginous matters from liquids, it being impossible to filter them off. If the liquid, however, be treated with lignite or turf, or a mixture of the two, not only is the gummy or mucilaginous matter absorbed, but also that which is impure and discolouring. The method varies according to the material to be filtered. Generally it is only necessary to filter the liquid through the material specified, but sometimes the lignite or peat is dried and finally powdered, and then mixed in suitable proportion with the liquid to be filtered. The mixture thus obtained is pressed or filtered in any convenient manner to obtain the cleared and purified liquid; in most cases filter presses should be used. After using the material it still remains suitable for fuel. The necessary temperature varies according to the substance to be filtered.

64201. L. BARBIER, Brussels. *Improvements in the manufacture of glucose.* 18th February, 1884. This invention relates to the manufacture of glucose, and consists in separating the albumenoids from the saccharine matters produced from vegetables, especially from grain. This separation is effected by the ordinary processes used in manufacturing crystallizable sugar, such as those known as defecation, or double carbonation.

64251. P. A. DUELLE, Brussels. *Improvements in the process of extracting syrups from the residues of the first and second processes in the manufacture of beet-root sugar by successive concentrations.* 23rd February, 1884. The inventor claims a method of extracting sugar from the residues of the first and second

processes in making beetroot sugar. It consists in purifying the syrups from the first or second process if necessary, just as they come from the turbine by osmose. The syrup is further purified by filtration through powdered animal charcoal to remove the existing saline matter and to render it sufficiently pure for concentration. The syrups of the first and second processes can thus be immediately utilised, drawing them off at once from the sugar purified by these two operations.

64337. M. MAERCKER, Brussels. *Process of treating the refuse left after diffusion in the manufacture of sugar.* March 15th, 1884. The inventor claims a method of extracting the water from the combustible materials left in a damp state after the manufacture of sugar or other substances, by adding in small quantities lime, salts of lime, caustic or carbonated alkalies, ammonia or alkaline earth, chloride of sodium, and other soluble alkaline, salts, or alkaline earths.

64371. E. REBOUX, Brussels. *Apparatus for rectilineal root cutting.* 4th March, 1884. The inventor claims—first, the apparatus consisting of a knife carrying table, moving horizontally backwards and forwards, like a planing machine, combined with a holder furnished with draw bars arranged in the direction of the motion, and with movable lids on hinges. Second, the table having cutting knives on both sides placed almost horizontally, and supported longitudinally in the direction of partitions, acting exactly alike which ever way the table moves, and raised and lowered at will, according to the thickness of the slips to be cut.

64443. J. KASALOVSKY, Brussels. *Improvements in osmose apparatus.* March 10th, 1884. The inventor claims—first, the use of osmose apparatus frames which allow of the liquid being spread over the whole surface of them, so as to produce a uniform and regular current over the whole surface of the membrane. Second, the construction of an osmose apparatus, with frames arranged close together, as in an apparatus with combined frames, so as to establish perpendicular circulating currents in opposite directions of the molasses and of water respectively.

GERMAN.

ABRIDGMENTS.

29019. ROBERT ILGES, Cöln, Bayenthal. *An evaporating apparatus for continuous working.* 23rd December, 1883. The evaporation of the solution is effected by pressure and with continuous movement in such a manner that an uninterrupted stream of the solution flows through a set of horizontal boiler tubes, which it only partially fills, to a row of evaporators. The said stream spreads out into thin layers, and, being continuously evaporated, the vapour evolved is used for boiling down the remainder of the solution which flows continuously to the next evaporator at a less pressure. The liquid describes a long zigzag way in each evaporator. A partition with a

lip is fixed under each horizontal row of pipes. The latter alternate in size, first on one side and then on the other of the boiler, so that the liquid of a whole row is discharged simultaneously over the lower lips of the smaller cross pieces and over the higher partitions with higher lips, and flows through the corresponding separate rows of horizontal pipes placed one under another on its way there and back. The solution to be evaporated, as well as the condensing water, are conveyed from one evaporator to another by means of pipes. Horizontal plates alternately shortened at their ends aid in conducting the vapour within the heating spaces along a zigzag way to the boiler pipes, while the vapour from the juice has the condensed water withdrawn from it in a dome before it enters the next evaporator. The evaporating apparatus can be used for evaporating solutions at a less pressure and at a lower temperature by using steam at a lower temperature for the heating chamber of the first evaporator, and reducing the pressure by aid of an air pump in the heating chamber of the last evaporator.

29015. JOSEPH GÖRZ, Berlin. *Apparatus for the elektrolysis of liquids containing sugar.* 27th November, 1883. Two annular elektrodes are fixed in the vacuum. One of them has an angular cross section, and is fastened to the side of the vacuum frame by a support of insulating material, and provided with a clamp for connecting it to a conductor of the electric current. The other elektrode is fastened on the lower edge of a cylinder composed of sheet iron, which is supported by bars fastened in the side of the vacuum pan, but is insulated from it by means of a cap and washer made of insulating material. One of these bars carries the pole. The heating coils are placed in the space between the side of the vacuum pan and cylinder. The juice from the sugar circulates in the vacuum, and becoming heated by passing through the coils rises and falls into the inner cylinder. Thus, it continually passes the circular space between both elektrodes, and becomes exposed to the action of the electric current.

29538. F. HALLSTROM, Nienburg on the Saale. *Improvement in heating coils for vacuum apparatus.* 30th April, 1884. The pipes of the heating coils have according to the degree of heat given off from the heated vapour during its passage through the latter a corresponding diminution in size, thus enabling the heated surfaces to give off a more perfect and uniform heat.

Patentees of Inventions connected with the production, manufacture, and refining of sugar will find *The Sugar Cane* the best medium for their advertisements.

The Sugar Cane has a wide circulation among planters in all sugar producing countries, as well as among refiners, merchants, commission agents, and brokers, interested in the trade, at home and abroad.

IMPORTS (UNITED KINGDOM) OF RAW AND REFINED SUGARS.

JANUARY 1ST TO AUGUST 31ST, 1885.

Board of Trade Returns.

RAW SUGARS.	QUANTITIES.		VALUE.	
	1884.	1885.	1884.	1885.
	Cwts.	Cwts.	£	£
Germany	4,147,611	5,247,769	3,317,885	3,183,470
Holland	130,868	185,695	104,157	128,101
Belgium	386,989	280,335	325,983	190,323
France	51,785	22,212	50,251	17,691
British West Indies & Guiana	2,444,379	2,115,601	2,364,835	1,704,072
British East Indies	752,545	465,242	473,348	232,964
China and Hong Kong	103,647	14,679	71,476	5,644
Mauritius	224,072	155,131	171,553	108,932
Spanish West India Islands	427,695	621,663	332,902	473,933
Brazil	1,141,337	1,093,387	890,591	655,051
Java	2,607,843	2,903,223	2,463,094	2,195,211
Philippine Islands	545,736	238,269	361,481	117,085
Peru	290,684	429,295	259,961	302,828
Other Countries	385,607	431,541	338,165	297,329
Total of Raw Sugars ..	13,640,798	14,204,042	11,525,682	9,612,634
Molasses	336,000	281,817	121,663	97,146
Total Raw Sugars ....	.....	.....	14,904,130	13,146,784
REFINED SUGARS.				
Germany	452,484	610,473	491,039	513,704
Holland	895,012	928,277	991,326	840,271
Belgium	57,847	52,772	69,558	53,010
France	811,392	413,181	944,722	388,285
United States	702,739	1,820,275	734,693	1,639,912
Other Countries	22,420	2,167	25,447	1,822
Total of Refined	2,941,894	3,827,145	3,256,785	3,437,004
EXPORTS.				
	Cwts.	Cwts.	£	£
Denmark	150,123	86,059	128,599	66,792
Belgium	60,817	51,232	52,202	35,641
France	137,788	55,736	123,184	42,798
Portugal, Azores, & Madeira	65,538	56,442	56,409	41,865
Italy	159,956	164,968	142,548	115,938
British North America	58,054	15,535	49,029	10,352
Other Countries	258,345	204,568	252,843	155,274
	890,621	634,540	804,814	468,660

IMPORTS OF FOREIGN REFINED SUGAR.

The British Sugar Refiners' Committee furnish us with the following figures, giving the imports of foreign refined sugar for the month of August compared with the corresponding month of last year, and the average monthly imports for the year compared with those of 1883 and 1884, distinguishing the quantities of "Lumps and Loaves" from "other sorts," and giving the separate imports from each country:—

	"LUMPS AND LOAVES."				"OTHER SORTS," Including Crushed Loaf, Granulated, Crystallized, &c.				TOTAL.			
	Monthly Average.		Aug.,		Monthly Average.		Aug.,		Monthly Average.		Aug.,	
	1883.	1884.	1885.	1884.	1883.	1884.	1885.	1884.	1883.	1884.	1885.	1884.
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
France	3538	2737	1027	2166	2477	1621	546	164	6015	4358	1191	3454
Holland	2352	3580	3780	3692	1853	1948	1555	1321	4205	5528	5101	5863
Germany & Austria	588	552	1142	947	1854	2380	2859	1193	2442	2932	2335	2488
Belgium	319	183	82	215	124	151	116	33	443	334	115	271
United States	226	992	824	817	294	3386	10654	6056	520	4348	6880	4977
Other Countries ..	..	..	..	..	61	121	12	..	61	121	..	10
Total	7023	8014	6855	7837	6663	9607	15742	8767	13686	17621	15022	17063

SUGAR STATISTICS—GREAT BRITAIN.

To SEPTEMBER 19TH, 1885 AND 1884. IN THOUSANDS OF TONS, TO

	THE NEAREST THOUSAND.		THE NEAREST THOUSAND.		THE NEAREST THOUSAND.	
	STOCKS.		DELIVERIES.		IMPORTS.	
	1885.	1884.	1885.	1884.	1885.	1884.
London	96 ..	100	240 ..	259	246 ..	274
Liverpool ..	120 ..	115	202 ..	201	211 ..	239
Bristol	6 ..	5	36 ..	40	38 ..	39
Clyde	82 ..	53	174 ..	176	207 ..	168
Total ..	304	273	652	676	702	720
	Increase ..	31	Decrease ..	24	Decrease ..	18

SUGAR STATISTICS—UNITED STATES.

(From Messrs. Willett & Hamlin's Circular, New York.)

FOR THE FOUR PRINCIPAL PORTS. IN THOUSANDS OF TONS, TO THE NEAREST THOUSAND. FOR AUGUST, 1885 AND 1884.

	STOCKS.		DELIVERIES.		IMPORTS.	
	Aug. 1st,		For July,		For July,	
	1885.	1884.	1885.	1884.	1885.	1884.
New York	109 ..	124	71 ..	70	53 ..	53
Boston	32 ..	32	15 ..	21	8 ..	21
Philadelphia....	8 ..	7	10 ..	8	8 ..	7
Baltimore .....	.. ..	..	.. ..	..	.. ..	..
Total.....	149	163	96	99	69	81
	Decrease ..	14	Decrease ..	3	Increase ..	12
Total for the year ..	..	..	786	737	846	839

In the case of Baltimore, where nothing is put down, it means that the Stock, Imports, and Deliveries, do not exceed 500 tons in each case.

NEW YORK PRICES FOR SUGAR.

From Willett, Hamlin & Co.'s Report, September 17th, 1885.

FAIR REFINING.	96° CENTS.	GRANU- LATED.	STAND. A.	STOCK IN FOUR PORTS.
Sept. 17, 1885.—5 7-16c.	6 3-16c.	7 c.	6 3/4c.	Jan. 1, 1885—89,186 tons.
Sept. 18, 1884.—4 3/4c.	5 3/4c.	6 9-16c.	6 1-16c.	Jan. 1, 1884—60,900 tons.
Sept. 20, 1883.—6 9-16c.	7 9-16c.	8 3/4-13-16c.	8 3/4c.	Jan. 1, 1883—50,297 tons.
Sept. 21, 1882.—7 5-16c.	8 1/4c.	9 1/4c.	9 c.	Jan. 1, 1882—43,927 tons.
Sept. 22, 1881.—7 15-16c.	8 3/4c.	10 c.	9 3/4c.	Jan. 1, 1881—66,999 tons.
Sept. 16, 1880.—7 1/4c.	8 3-16c.	9 15-16-10c	9 1/4-1/2c.	Jan. 1, 1880—63,558 tons.
Sept. 18, 1879.—6 13-16c.	7 7-16c.	8 3/4c.	8 3/4c.	Jan. 1, 1879—50,773 tons.
Sept. 19, 1878.—7 3/4c.	8 1/4c.	9 3/4-1/2c.	9 1/4-1/2c.	Jan. 1, 1878—48,230 tons.
Sept. 20, 1877.—8 3/4c.	9 3/4c.	10 3/4c.	10 1/4c.	Jan. 1, 1877—25,885 tons.

STOCKS OF SUGAR IN THE CHIEF MARKETS OF EUROPE ON THE
31ST JULY, FOR THREE YEARS, IN THOUSANDS
OF TONS, TO THE NEAREST THOUSAND.

Great Britain.	France.	Holland	German Empire.	Austria.	Remaining four principal entrepôts.	TOTAL 1885.	TOTAL 1884.	TOTAL 1883.
320	184	36	100	17	24	681	536	394

CONSUMPTION OF SUGAR IN EUROPE FOR THREE YEARS, ENDING
31ST JULY, IN THOUSANDS OF TONS, TO THE
NEAREST THOUSAND.

Great Britain.	France.	Holland	German Empire.	Austria.	Remaining four principal entrepôts.	TOTAL 1885.	TOTAL 1884.	TOTAL 1883.
1206	478	58	389	193	336	2660	2495	2434

ESTIMATED CROP OF BEET ROOT SUGAR ON THE CONTINENT OF EUROPE,
FOR THE PRESENT CAMPAIGN, COMPARED WITH THE ACTUAL CROPS
OF THE THREE PREVIOUS CAMPAIGNS.

(From *Litch's Monthly Circular*.)

	1884-85.	1883-84.	1882-83.	1881-82.
	Tons.	Tons.	Tons.	Tons.
France.....	315,000	.. 473,676	.. 423,194	.. 393,269
Germany Empire ..	1,150,000	.. 986,403	.. 848,124	.. 644,775
Austro-Hungary....	540,000	.. 445,952	.. 473,002	.. 411,015
Russia and Poland ..	380,000	.. 307,697	.. 284,991	.. 308,799
Belgium	90,000	.. 106,586	.. 82,723	.. 73,136
Holland and other Countries.....	50,000	.. 40,000	.. 35,000	.. 30,000
Total.....	2,525,000	2,360,314	2,147,034	1,860,994

Mr. Litch defers until next month his detailed estimate for the coming Campaign, 1885-86. From present appearances he considers that the deficit as compared with the Campaign, 1884-85, now closing, will be about 450,000 tons.

STATE AND PROSPECTS OF THE ENGLISH SUGAR MARKET.

During the first fortnight of the past month a good business both in raws and refined was done, with some improvement in prices. Beet 88% f.o.b., which a month ago stood at 15s. to 15s. 3d., rose to 16s. 3d. prompt. Influenced by conflicting accounts of the new European crop,—Mr. Licht puts the deficiency down at 450,000 tons, whilst in the opinion of others it is likely to be considerably under this figure,—a relapse took place, and the present quotation is 15s. to 15s. 3d. prompt, and 15s. 6d. to 15s. 7½d. for the new crop. Tate's Cubes, which a fortnight ago fetched 23s. 6d., are now 22s. 6d. A quiet tone pervades the market, both for raws and refined—refiners and the trade holding aloof, or buying merely from hand to mouth. In another fortnight they will be able to see more clearly into the future.

On the 19th September the deliveries in the United Kingdom for 1885 show a decrease of 24,646 tons, as compared with the same period of last year, and the imports show a decrease of 17,670 tons.

The imports of American refined for the eight months ending August 31st amounted to 91,006 tons, against 35,413 tons for the period in 1884.

On the 19th September the stocks in the United Kingdom were 303,645 tons, against 273,209 tons in 1884, and 198,212 tons in 1883.

Present quotations for the standard qualities, as under, are:—


FLOATING.		Last Month.
Porto Rico, fair to good Refining	15/- to 15/6	against 15/- to 15/6.
Cuba Centrifugals, 96% polarization	16/9 to 17/-	„ 17/- to 17/3.
Cuba Muscovados, fair to good Refining..	14/9 to 15/3	„ 14/6 to 15/-.
Bahia, middling to good Brown, No. 7 to 8½	13/- to 14/-	„ 12/6 to 13/-.
Pernambuco, good to fine Brown	14/- to 14/3	„ 14/- to 14/3.
Java, No. 14 to 15	17/6 to 17/9	„ 17/9 to 18/-.
LANDED.		Last Month.
Madras Cane Jaggery	11/6 to 11/9	against 11/- to 11/6.
Manilla Cebu and Ilo Ilo	11/6 to 11/9	„ 11/6 to 12/-.
Paris Loaves, f.o.b.	21/3 to 21/6	„ 20/- to 20/6.
Titlers	21/3	„ 21/-
Tate's Cubes	22/6	„ 23/-
Austrian-German Beetroot, 88% f.o.b. ..	15/- to 15/3	„ 15/6 to 15/9.

THE SUGAR CANE.

No. 196.

NOVEMBER 2, 1885.

VOL. XVII.

 The writers alone are responsible for their statements.

N.B.—All communications to be addressed, and Cheques and P.O. Orders made payable to HENRY THORP, Ducie Chambers, 57, Market Street, Manchester.

For Scale of Charges for Advertisements, see page xi.

For Table of Contents, see opposite the last page of each Number

SUGAR REFINING BY ELECTRICITY.—In our last issue page 505, we stated that Professor Friend, the inventor, was to leave New York for Liverpool on the 3rd ult. We now learn that in consequence of his not being able to complete certain necessary arrangements before leaving, he was prevented from carrying out his intention. The latest advice we have is, that he was to sail on the 31st ult.

Mr. Martineau has addressed two letters to the Editor of the New York *Nation* on the subject of the American sugar bounties. We mentioned last month, that the Editor of this paper in speaking of these bounties, stated, that he was not aware of their existence, and in fact was inclined to question whether they did exist. (See page 573.)

According to the Dutch Colonial Minister, Java planters make a good thing out of their sugar if they get 8 to 9 guilders for quality No. 14, per picul. As we show at page 589, this means 12s. 1d. per cwt. At to day's prices for this sugar they are getting 1s. per cwt. more than this.

Mr. Mc.Cormick sends us a detailed statement showing the cost of making muscovado in Porto Rico. He makes the cost to be not quite 11s. per cwt.; if to this, we add freight and charges up to time of realization, also the loss in weight, which together will not be less than 4s. per cwt., it will make a total cost of 15s. per cwt. The present price here for this sugar is 14s. 6d., so that

upon this showing, Porto Rico planters are not holding their own, to say nothing of interest upon capital invested. (See page 565.)

At page 577 we give a detailed report of the result of the experiments which have lately been made in Barbados, showing the advantages on the side of making vacuum pan sugar as compared with Muscovado. To put down a vacuum pan plant means a considerable outlay, upon which 5 per cent. interest and 10 per cent. for depreciation should be charged, and if this is done, 2s. per cwt., at least, will have to be placed to the debit of the vacuum pan process.

The Lancashire Sugar Refiners' Association, in their reply to questions from the Commission on Trade Depression, after setting forth the injurious effects upon their trade of hostile tariffs and foreign bounties, state that any prosperity the industry has enjoyed, has been due to the increase of consumption, consequent upon the reduction and abolition of the duty; and that the present rate of wages is above the average of the past twenty years.

In the list of those forming the Commission on trade depression, which we gave last month, we find, upon comparing it with that in the *London Gazette*, since issued, that the names of Sir Louis Mallet, and Mr. W. Fowler, M.P., are left out. Striking these two names out of the list we gave (page 521), and adding to it that of Mr. George Schlatter-Booth, M.P., will make the list complete—there are 23 members in all.

The Secretary of the Workmen's National Association for the Abolition of Foreign Sugar Bounties has addressed a letter to Mr. John Bright, M.P., asking his assistance in getting the foreign bounties abolished, to which Mr. Bright sends a very short reply, simply referring him to Sir Thomas Farrer's *Work on Free Trade versus Fair Trade*, and to that chapter in it on the sugar question—which Mr. Bright considers conclusive. To this letter of Mr. Bright's, the Secretary sends a reply, dealing specially with Sir Thomas Farrer's chapter on sugar. (See page 596.)

In 1882 the number of silos in this country was half-a-dozen, last year there was 610, and it is stated that the number at the present time cannot be less than 1,200. At first, as was only natural, a good deal of prejudice was shown at its introduction and for this prejudice to be lived down, within four years, speaks volumes for the system. At page 593 we give a preliminary report of the private Ensilage Commission, presented to the Agricultural Department.

We have had sent to us the particulars of an Account Sales of a shipment of sugar from the West Indies to this country, which we should hope is without a parallel. The shipment was made in the autumn of 1883, when the price of fair to good refining was 20s., it was held in the hope of obtaining a better price, and after keeping it a year and a quarter it was sold, in December last, at 10s., or rather this was the figure at which the sale was reported. The expenses were just over £6 the ton, that is for commission, discount, loss in weight, freight and sundries; leaving for the unfortunate planter not quite £4 per ton. The charge made for freight was 2s. 6d. per cwt.

The falling off in the consumption of coffee in this country is attracting some attention. In 1860 the consumption, with a population of 29,000,000, was 35,674,381 lbs., or 1.23 lbs. per head. In 1884, with a population of 36,000,000, the consumption was only 33,016,256 lbs., or 0.91 lb. per head, or a diminution of 25 per cent. On the other hand, the consumption of cocoa during the same period has increased from 0.12 lb. per head to 0.38 lb. per head. The increase in the consumption of tea shows an important increase. In 1860, 2.66 lbs. per head were consumed, in 1884 it was 4.82 lbs. per head.

This decrease in the consumption of coffee is the more remarkable, since during the past few years a very large number of coffee houses have been established throughout Great Britain and Ireland.

In some papers we see that the figures given are 69,000 tons in 1861, against 41,000 in 1884, a diminution of 28,000 tons since 1861, which is evidently an error.

The reports of the Louisiana crop is on the whole favourable. The acreage, owing to the low price of sugar, and partly to the floods, is less, but the yield in sugar per acre is expected to be greater than in the previous season. In actual results the present crop, it is thought, will show up better than the last. The rains which damaged the rice and cotton, proved good for the cane. We understand that the cost of working the crop will be less this year.

In another part we give a statement (see page 589) which goes to show that at 13s. per cwt. at port of shipment, the Java sugar planters see a fair remuneration—the Louisiana sugar planter, we imagine, would require nearly double this figure to leave him a fair remuneration.

Mr. Goschen in his speech, at Hendon, on the 21st ult., alludes to the Commission on Trade Depression in the following terms:—
“I say frankly that the Commission may collect much valuable information, but, as regards legislation, I want to know what legislation is possible, and what legislation can be proposed? Is it to be suggested that we are to have protective duties? Therefore when Lord Iddesleigh speaks of legislation, unless they are going to change the currency of the country, I do not know what legislation is possible, unless they deal with protective duty. I object to this Commission, not because I do not value statistics, but because I protest against the idea that it will be possible, by legislation, to correct foreign competition by any device for the protection of native industries short of a universal system of protection. If the manufacturers of machinery were protected, what would the farmer and agricultural labourer say, when they had to buy ploughs and agricultural implements at a greater price by reason of their protection? They would claim that their produce—that is the food of the people—should be protected also. You cannot have protection for some, without having protection for all industries. How then are we to deal with foreign competition? There is one mode of dealing with it. We ought so to augment our resources, that we should be able to compete with the foreigners. For himself he thought that the spread of technical education was the most potent means of gaining for English hands the largest amount of profitable industry.

COST OF PRODUCING MUSCOVADO SUGAR IN
PORTO RICO IN 1884.

By JAMES McCORMICK.

Porto Rico, June, 1885.

At the present time, when a good deal of discussion is taking place regarding the cost at which sugar is produced in different countries, the following elaborate and carefully prepared statement, which shows in minute detail the expenses of cane cultivation and manufacturing muscovado sugar in Porto Rico, may be interesting to some of the readers of the *Sugar Cane*, and useful for the purposes of comparison.

A fair annual sugar crop of the island of Porto Rico, including about 25,000 tons, or their equivalents in syrups, &c., used in the home consumption,—the number of inhabitants being 800,000,—is 115,000 tons.

Memo.—An acre of ground in Porto Rico, *una cuerda*, is an acre of 25 varas Castellans square, each being of the length of 3 ordinary varas, equal therefore 5625 square varas. The vara is about 33 English inches, therefore an acre, or cuerda, comprises 4726 English square yards,—114 square yards less than an English acre,—an immaterial difference for the purposes of the following calculation. A Spanish quintal = 4 arrobas of 25 lbs. is 100 lbs., equal to 101½ lbs. English;—also but a slight variation. We shall not therefore think it necessary to take the fractions into account in making the following estimates. The rate of exchange is taken at \$5.40 per £ sterling, the rates having ranged between \$5.25 and \$5.60 for some years past.

It is not intended to profess that the following calculations are transcripts of actual results obtained in practice, with the exception of isolated cases, few and far between, they are rather meant to be an illustration of that which *can* very easily,—and which indeed *should* always be the case. The argument pre-supposes first-rate cane lands, “Vegas,” such as are almost universally under cane cultivation in Porto Rico, and a fairly good season. And it assumes also the exercise of sound calculation and skilful management, good farming and efficient work in every department, beginning in the field and ending with the delivery of the produce at market.

Under such conditions, we shall take the case of an estate taking off annually a crop of 800 hogsheads, of 1400 lbs. net weight each

= 500 tons, in 120 working days (say nominally 7 hogsheads, about $4\frac{1}{2}$ tons per day) of muscovado sugar, from one set of coppers,—one battery,—or 11,250 quintals, 500 tons of sugar from 200 acres of canes and 375 acres total extent of property, apportioned thus:—

50 acres of “*plant*” canes.

150 „ about equally divided between 1st, 2nd, and 3rd
“*ratoons*.”

For crop, 200 acres; fallow, and in preparation, 50; in pasture, &c., &c., 125; total, 375 acres.

EXPENSES OF CULTIVATION.

50 acres of pasture, brush, &c., virgin soil:—

Preparation of the land, mowing or clearing off, burning, &c. Per acre	\$4.00
1st. Ploughing, superficial scratching or scarifying, with light country plough, which loosens the roots of weeds, <i>pará</i> grass (“ <i>malojillo</i> ”), &c., but does not turn over a slice or furrow	1.25
Gathering together the said roots, stumps, &c., piling up, and burning	1.25
	<hr/>
	\$6.50

The land is now thoroughly *prepared* for good ploughing, and proper *after* work; an expense generally saved from a very mistaken intention to economize.

PLOUGHINGS.

1st. Ploughing with heavy plough and sub- soiler attached, two yoke of oxen, one man at 75 cents, and two boys at 25 cents each day; <i>deep</i> furrow, and <i>narrow</i> , cut, or slice, thoroughly turned, $\frac{1}{3}$ rd acre per day	\$3.75 = 6.50
After a sufficient interval of time, harrowing, or clod crushing, per acre	1.00
2nd. Ploughing, one yoke, &c.	2.00
2nd harrowing, or clod crushing	0.75
3rd. Ploughing	1.50
Last harrowing or clod crushing	0.50 = 9.50
	<hr/>
Carried forward.....	\$16.00

Brought forward	= \$16.00
The land is now in a state of <i>tillth</i> , thoroughly well prepared and tilled, a condition too generally imperfectly done. Lining for furrowing, 6 feet apart. Furrowing, and passing sub-soiler along the furrow	3.00
Two Cart-loads of tops or cuttings for planting	1.50
Planting with <i>one</i> top for "grande culture;" <i>i. e.</i> , autumn planting; with <i>two</i> tops for spring planting. In the first case the canes to be cropped at 15 or 16 months from date of planting; in the other case at about 12 months. Distances apart, 6 feet by 5 or 6 by 4, 1700 to 2000 "stools," or holes per acre.....	5.50 = 10.00
	<hr/>
	Per acre \$26.00

(N.B. Seldom or *never* "holing," but always either furrow—"de chorro,—planting or "crowbar," *i. e.*, vertical planting.)

The cost of \$10 per acre for planting assumes very carefully performed, efficient work. <i>Weedings</i> , and passing a horse hoe or cultivator, but, far better, a <i>very light</i> American plough between the rows, and moulding up, 5 times at \$2 ..	10.00
One "desmache," <i>i. e.</i> , removal of all "suckers" and bastard sprouts from stools	3.00
One stripping or trashing, <i>i. e.</i> , removal of all <i>dry</i> leaves	4.00
Proportion per acre of thoroughly good ditching and drainage, &c.....	8.00
Proportion per acre of bridges, &c.	2.00
Ratcatcher and sundries, per acre.....	1.00
Cutting of canes	6.00 = 34.00
	<hr/>
Total per acre ..	\$60.00

\$60 per acre for plant canes on virgin soil:—if planted on cane land *renewed*, the first expense of *preparing* the land must be reduced by \$4. Let us assume, however, an average cost per acre of \$60, but this implies *first rate work*, thoroughly efficient in all respects, and intended to *ensure* a return per acre of at least 1,200 to 1,500

quintals of canes, about 60 tons; of not less density of juice, by Beaume's scale than 10°, and yielding at 7 per cent., extraction of dry sugar, 6 to 7 hogsheads = 90 quintals, or say 4 tons of marketable muscovado sugar per acre.

AVERAGE COST OF CULTIVATION OF RATOONS.

Opening up, and lining trash, or burning off, per acre	\$2.50
Light ploughing, and moulding up	3.00
Running the "cultivator" or light plough through the rows, and weeding four at \$2	8.00
Supplying (objectionable, and hardly ever admissible)	2.00
Cleaning out ditches and drains, &c., proportion per acre	3.50
One stripping or trashing	3.00
Repairs to bridges, ratcatcher, &c.	2.00
Cutting	4.00

Average expenses per acre.. \$28.00

To ensure as an average per acre from 1st, 2nd, and 3rd "ratoons," in equal proportion, a return of 600 to 650 quintals (28 tons) of canes, of 10½° Beaume, say at 7 per cent. extraction, a yield of 45 quintals of sugar, or say 2 tons per acre.

The cost of cultivation, *i. e.*, purely field work, is then as follows:—

50 acres of plant canes, at	\$60 = 3,000
150 do. 1st, 2nd, and 3rd ratoons, average	28 = 4,200

200 acres for crop (cost, average per acre, \$36) \$7,200

Yielding average of canes, per acre: For plants, 1,350 quintals; for ratoons, 625 quintals; average for the 200 acres, 800 quintals or 35.62 tons canes per acre.

Producing 50 acres plants, 60 tons canes, 4 tons sugar = 4,500 qtls.

150 ,, ratoons, 28 ,, 2 ,, = 6,750 ,,

200 ,, say 800 hogsheads = 500 tons, or 11250 ,,

Cost per ton of canes (7,143 tons for £1,333 4s.) = 3s. 9d. Cost of sugar, per hogshead, \$9; per quintal, 64 cents; per ton, £2 13s. 4d.

CARTAGE OF CANES.

160,000 quintals, equal to about 10,000 cart loads, average say 14½ cwt. each, at 10 cents per load, with good roads and proper supervision, \$1,000.

Cost per hogshead, sugar, \$1.25; per quintal, 0.9 cents; per ton, sugar = 7s. 6d.

MANUFACTURE.

Boiling house, &c., one set of coppers, making 800 hogsheads of sugar; 500 tons in 120 working days.	
Hands employed: Engine-room, 1 man, 1 boy, firemen 2; cane carrier and mill feeders, 8; clarifiers and wetzels, 1 man, 1 boy; boilermen, 3; green megass, carriage to "Logies" and stacking, 6; dry megass, trash wood, &c., 5; sundry jobs, 2; total hands in works, 30, at an average cost of 62½ cents per day including breakfast.....per crop	\$2,250
Potting of 800 hogsheads, at 25 cents.....	200
Lime, oil, lamps, paints, packing, belting, oakum, tubs, shovels, &c., &c.....	500
Per hogshead, \$3.69; per quintal, \$0.262; per ton, £1 1s. 10d.	

GENERAL EXPENSES.

<i>Salaries</i> :—1 manager, at \$1,500 per annum; 2 overseers, 1 at \$360, 1 at \$240; 1 head cartman, and in charge of cattle, &c., at \$200	2,300
Table for the above, \$8 per week	416
Empty hogsheads, at \$4, cooperages, heading up, nails, filling molasses, &c.	3,600
Cartage or transport to market on 800 hhds. sugar, 325 puns. molasses, at an average of \$1 per package ..	1,125
Taxes, subscriptions, donations, &c.	4,000
Movers and stable men, four at \$10 per month \$480.	
Ropes and "latigos," &c., 120	600
Replacement of stock, horses, &c., deducting value of old bulls sold, average	400
Repairs of carpenter work, carts, and agricultural implements and purchase of ditto of bricks, boards, &c., &c.	600
Repairs to engine, mill, boilers, copper hanging, works, sheds, &c.	800
Wear and tear of machinery, boiler-tubes, works, &c., say	1,159

Total general expenses.. \$15,000

Per hogshead, \$18.75; per quintal \$1.333; per ton, £5. 11s. 1d.

GRAND TOTAL.				
		Per Hhd.	Per Quintal.	Per Ton.
For Cultivation.....	\$7,200	.. \$9.00	.. \$0.64	.. £2 13 4
„ Cartage	1,000	.. 1.25	.. 0.09	.. 0 7 5
„ Manufacture	2,950	.. 3.69	.. 0.26.2..	1 1 10
„ General expenses	15,000	.. 18.75	.. 1.33.3..	5 11 1
	<u>\$26,150</u>	<u>\$32.69</u>	<u>\$2.32.5</u>	<u>£9 13 8</u>

N.B. It will be noted that no expense is incurred for the use of fertilizers or manures of any sort, the judicious application of which would, no doubt, greatly increase the quantity and improve the quality of the canes grown. No charge is made for insurance nor for providing a fund to meet extraordinary casualties and contingencies, &c.

RESULT.—To produce muscovado sugar in Porto-Rico costs, therefore, under favourable circumstances, and with able management, yielding an average return of, say $2\frac{1}{2}$ tons of sugar per acre, somewhat less than £10 per ton.

PRO-FORMA SALES OF PRODUCE IN 1884.

800 hhds. sugar, 11,250 qtls. at \$3	\$33,750
325 puns. molasses, 35,750 gallons, at 10 cts. ..	3,575
50 puns. rum, at \$25	1,250
	<u>Gross proceeds..</u>
	\$38,575
Total expenses, as above	26,150
	<u>Net return....</u>
	<u>\$12,425</u>

On estimated value of property, say \$125,000, = 10 per cent.

The following may be taken as a *fair* example of actual results obtained from what is considered to be a “well-managed” sugar estate on the North Coast of Porto-Rico:—

An estate of 550 acres in extent, producing 800 hogsheads of sugar, 11,250 quintals, = equal 500 tons per crop of 130 working days.

70 acres of plant canes; 230 of ratoons; 300 acres of canes for crop; 70 fallow and in preparation; and 180 in pastures, &c. Total 550.

Cultivation: 70 acres of plants yielding 800 quintals of canes = 36 tons per acre, at \$52 = \$3,640.

230 acres of ratoons, average—

540 quintals = 24 tons per acre, at \$28 = 6.440.

300 acres, average 600 quintals = 27 tons per acre .. \$10,080

Producing at $6\frac{1}{4}$ per cent. yield of dry marketable
sugar, 11,250 quintals of sugar = 500 tons per
acre, average 36.15 quintals = 1.66 tons.

Cartages 1,250

Manufacture: 130 days of crop, at 30 hands per day,
average wages per day, \$62 $\frac{1}{2}$ = 2,437

Potting and sundries, as preceding account 700

General expenses, as before, say = 15,000

Total expenses = .. \$29,467

At Exchange of \$540 = £5,457.

Equal per hogshhead to \$36.83; per quintal to \$2.62; per ton
to £10 18s. 3d., say £11 per ton.

VALUE OF PRODUCE, AS BEFORE.

Sugar, 11,250 quintals, at \$3 = \$33,750

Molasses, 325 puns. = 3,575

Rum, 50 puns., at \$25 = 1,250

Total gross.. ——— \$38,575

Expenses, as detailed 29,467

Net.. \$9,108

Equal to 7.30 per cent. on \$125,000, the estimated value of the
property.

CANE CRUSHING IN THE BRAZILS, WITH STEWART'S HYDRAULIC ATTACHMENT.

The following letter on this subject will interest our planters:—

Usine Claudio, Macahé, 14th September, 1885.

Messrs. DUNCAN, STEWART & Co., Glasgow.

Gentlemen,

I have to thank you extremely for your kind attention to my letter of the 10th June last. It may, perhaps, interest you to know that I have already put the machinery of this factory round, making an experiment with some forty tons of canes, and am happy to inform you everything worked most satisfactorily. The cane piece accidentally caught fire; this coupled with the fact of their being aged by a delay, after cutting in transporting to the usine, owing to the line being in an unfinished state, I did not conceive it fair to make the working analytical as to results; suffice it to say I

found the percentage obtained by the mill using your Hydraulic patent excellent. It is the first time I have used it. I consider it quite supersedes maceration, and does away with all the costly working of a second crushing at a very moderate pressure, the megass came away from the mill perfectly dry, and much in the form of paper pulp; this, with your independent engine for working the cane carrier, was a perfection in crushing I don't think I have seen equalled before. On the one hand irregular feeding is corrected (the pressure adjusted itself to small quantity), and on the other an over-pressure of cane is avoided, without the necessity of either reducing the speed of the cane engine (which generally means stopping altogether unless there is a full head of steam on), or shutting off the cane carrier, either alternative being necessary where the latter works off the mill's gearing. With three boilers of the four we have worked, the entire house, using megass only, and direct from the mill. Of this feature in the factory I confess I was somewhat doubtful at first, that is to say, as regards their capability of keeping the buildings in steam. This was from my former experience in the central factories Pernambuco, and I may also add in Demerara. In the former there were eight boilers of much the same size as these, with the exception, of course, of their fire space (being coal boilers), but insufficiency of steam is the weak point in the factories when the megass is being burnt—dry megass of several days sunning—and I would say that in no one of these factories is the machinery more powerful than in this usine. These mills are set to do 250 tons in twenty-four hours. I suppose this mill would easily put through, without any push, over 300 tons; each boiler in their case has each its own chimney. In the latter case (Demerara), when I was leaving there, the different estates were making arrangements for burning the green megass, and in making these alterations, heightening the chimney seemed to be considered essential for giving the required draught, and this was being invariably done, even where the height was already considerably over 100 feet. With the chimney to these boilers, which at a rough guess I set at 35 feet *with* superheater, we kept our fires burning furiously, previously starting them with wood, and, as I say, the three boilers did our work. I may add that some of the directors of the "Quissaman Usine" (the largest factory in Brazil) have intimated their wish to see these, so successful have they been considered. The triple effets also gave every satisfaction, as especially the pans.

In my report to the proprietors I inform them that all I require is that the canes come to the mill regularly to ensure a constant supply of syrup to the pans, through the filtering process as arranged, and I predict a most successful working throughout.

I am, gentlemen, your obedient servant,

(Signed)

FRANCIS A. TREW.

THE (NEW YORK) *NATION* AND THE UNITED STATES
BOUNTY ON THE EXPORTATION OF REFINED
SUGARS.

The following letter from Mr. Martineau to *The Nation* on the Bounty Question, appeared in their issue of 17th September; to which we annex a second letter from Mr. Martineau in reply to the Editor's comments:—

TO THE EDITOR OF THE "NATION."

SIR,—Will you permit me to say a few words in reference to your remarks on this subject in the *Nation* of the 13th ult.? You say you have never heard of the bounty, and do not believe it exists. In reply I should like to call your attention first to the very admirable annual review of the Sugar Trade of the United States given in the New York *Shipping and Commercial List* of January 17, 1885, in which the following passage occurs:—

"One of the most notable features of the operations of the year has been the large exports of refined, aggregating 63,643 tons, the bulk of which has been shipped away from the port of New York. The increase compared with last year, which aggregates over 50,000 tons, has been mainly shipments made to Great Britain, where the product of our refineries has found ready sale, and successfully competed with the output of British refineries. This has been possible, however, solely in consequence of the drawback allowed to exporters under the present tariff law, which is tantamount to a bounty, and has given our refined product an advantage which it could not have obtained otherwise in a country where sugar is admitted free of duty."

Secondly, I would direct your attention to an official publication, Bulletin No. 5 of the Department of Agriculture, entitled, "The Sugar Industry of the United States," and published at the Government Printing Office at Washington. At pages 26 to 36 of this interesting work you will find the whole subject completely stated, and the conclusion to which the writer comes is that the drawback should be 2·49 cents per pound instead of 2·82.

I would also bring to your notice, if space permitted, several articles in commercial journals, more especially one in *Bradstreet's* of the 25th July and another in the *Merchant's Review* of the 19th June, in both of which the writer conclusively shows that the present

drawback gives a bounty of at least 50 cents per hundred pounds. In May last, *Bradstreet's* wrote as follows:—

“It is generally admitted that the present drawback upon hard sugar is equal to a bonus of 50 cents per 100 lbs. As this amount comes out of the Treasury, the refiners have been exporting sugar at the country's expense.”

The New York *Price Current* of April 8 says:—

“For some time past the value of refined sugar has been maintained almost wholly by the export demand for granulated, which is profitable to refiners because of the drawback allowance which the Government makes, and which in reality amounts to a bounty estimated at about 50 cents per 100 pounds.”

As what I write must necessarily be suspected as coming from an interested source, I have been careful to confine my evidence to extracts from American papers or official statements; but if you or your readers care to have conclusive proof that there is a bounty of half a dollar, I can send you a few hard figures which cannot be refuted.

I am, Sir, yours faithfully,

GEORGE MARTINEAU,

Secretary British Sugar Refiners' Committee.

London, 21, Mincing Lane, September 3, 1885.

[Without stopping to give our reasons for not attaching the same credit to the authorities cited that Mr. Martineau does, we proceed at once to the matter in dispute. In 1875 the drawback was \$3.60. In 1877 it was reduced to \$3.18, but not, as the British refiners alleged, in a communication to Lord Salisbury last July, in consequence of their representations to our Government. At that time the duty was based solely on *colour*, and the drawback was on the average duty paid on importations. But foreign cane-sugar growers found that, with vacuum pan and centrifugal, they could make a very high-testing or pure sugar with a dark colour, so that the Government received a much lower duty on the pound of actual sugar than before. Hence the drawback as it stood was excessive, and three commissions were appointed in as many cities to report upon it. The Boston commission's view, that the drawback should be reduced, and reduced to \$3.18, was adopted by Government. This was a “proper amount,” according to Mr. Duncan, President of the British Refiners' Association, and probably the largest refiner in the world (see the communi-

cation to Lord Salisbury, referred to above, in the *Sugar Cane* for August, pp. 404, 405). Now the average rate of duty from 1877 to 1883 was \$2.37 per 100 pounds; at present it is \$2.08. Applying the rule of three, if \$3.18 was a proper drawback in those years, \$2.791 would be proper now—and it is actually \$2.82, less one per cent.

This drawback does not give 50 cents bounty, since even if colour did not enter into the existing tariff, pure sugar (100%) would pay \$2.40 entered as raw sugar. It is a curious fact that the export of refined sugar in 1883, prior to June 1, under the "proper" drawback, was unusually large; while after that date, and until February 1, 1884, under what Mr. Martineau calls a bounty of half a cent a pound, it ceased entirely. Any one who has followed the course of the markets can understand why exports recommenced at the latter date, and why they have been vastly larger in 1885 than in 1884: our British friends have been wildly speculative in the last eighteen months, and our exporters have taken advantage of it. Moreover, the British public have become enamoured of American granulated sugar.

That the drawback was not intended to be protective is notorious, and is admitted by the British refiners (*Sugar Cane*, p. 404). If the United States Treasury is suffering a "loss of two shillings per hundredweight" (*ibid.*), official investigations now making will doubtless discover the fact and apply the remedy.—ED. *Nation*.]

To these remarks of the Editor of the *Nation*, Mr. Martineau has sent the following reply:—

TO THE EDITOR OF THE "NATION."

SIR,—I beg to thank you for the insertion of my letter, and also for the remarks appended to it, which are the first indication of any attempt at defence of the present excessive drawback.

It is perfectly true that the drawback was reduced in 1877 from \$3.60 to \$3.18, and that the reduced drawback was fairly correct. The reduction was undoubtedly brought about by explanations which appeared from time to time in the papers, clearly showing that the drawback was excessive.

It now appears, from what you say, that the new drawback has been arrived at by a rule of three sum, on the assumption that the present average rate of duty is \$2.08. But how could that fact have

been ascertained, seeing that the new scale of duties had only just come into operation. Anyone who knows the kinds of raw sugar used in refining in the United States must be well aware that that figure does not represent the average duty paid. But even if it did, no such calculation as you suggest would arrive at the correct drawback on hard sugar. The basis on which the scale is constructed is the only indication—and a most infallible one—of what the drawback should be. There does not appear to be any object in having such a scale if the drawbacks are not calculated on the same basis.

You go on to point out that the present scale of duties is equivalent to a duty of \$2.40 on pure sugar. This fact is the best possible proof that a return of \$2.79 on the exportation of pure sugar must be a return of 39 cents more than has been paid.

I promised to give you hard figures in proof the bounty. You will find them in full at pages 26 to 30 of the Official Report of the Department of Agriculture on the Sugar Industry of the United States. Equally conclusive proofs have been given in the press, as for instance in "*Bradstreet's*" of the 25th July, and in the *Merchant's Review* of the 4th September.

When it is remembered that the new system of assessing the duty was devised for the express purpose of avoiding any further inaccuracy in drawbacks, it is difficult to understand why so much trouble was taken in adopting the polarimetric test as the indication of the yield of the raw material, and calculating a scale of duties based on \$2.40 for pure sugar, when an entirely arbitrary drawback, quite unconnected with the principle on which the new scale of duties is based, was afterwards dropped from the clouds.

In other countries a system of assessment of duty according to analysis has been adopted in order to ensure the abolition of the export bounty, but it was obvious to those who devised such a scale that the only way in which they could attain their object was to determine the drawbacks on the same basis. As the new scale of duties on raw sugar in the United States is based on a duty of \$2.40 for pure sugar, that is the only standard on which the drawbacks can be based if they are to return no more than the duty paid.

I am, Sir, yours faithfully,

(Signed)

GEORGE MARTINEAU.

21, Mincing Lane, 2nd October, 1885.

MUSCOVADO *versus* VACUUM PAN SUGAR.REPORT ON RESULT OF EXPERIMENTS CONDUCTED AT
BULKELEYS, JORDAN'S, AND BENTLEYS ESTATES,
BARBADOS.

BY A COMMITTEE OF THE AGRICULTURAL SOCIETY.

By the favour of Mr. J. B. Harrison, of the Government Laboratory, Barbados, we are able to give our readers a full report of the important experiment which has recently been made in that Island, as to the relative cost of producing muscovado and vacuum pan sugars.

The canes used were first crop canes, $2\frac{1}{2}$ acres being ground for each experiment. The canes used at *Bulkeleys* and *Jordans* were grown on the latter estate, and weighed in round numbers $26\frac{3}{4}$ tons per acre. These canes were rather over ripe, and were grown with "*Vickers Special Cane Manure*." The canes at *Bentleys* weighed in round numbers $30\frac{1}{2}$ tons per acre, and were grown with *Ohlendorff's* Dissolved Guano.

By "Manufacturing expenses" in the following table, is meant, expenses from the time the canes arrived at the mill door up to the delivery of the sugar.—ED. S. C.

The Committee appointed to superintend the experiments on sugar manufacture conducted at *Bulkeleys, Jordans, Carringtons*, and *Bentleys*, beg to submit the following tabular statement for the consideration of the Council.

They regret to have to state, that in consequence of some of the data, as at present furnished from *Carringtons*, not being considered absolutely reliable, they are not prepared, as yet, to lay before the Council the results of the experiment as carried out between *Carringtons* and *Bentleys*, but they hope at no distant date to be able to supply, satisfactorily, this information. They would remark, however, that as the three columns of figures, in the table presented, bring into comparison the results obtained on an estate having a vertical wind mill and train of open tayches (*Jordans*); on one furnished with steam crushing power, steam clarifiers, Aspinall pan and filter press (*Bentleys*); and on a third, supplied not only with a steam mill, but also with a vacuum pan, but without "mud" or "filter press" (*Bulkeleys*), the information supplied your Board will be found complete enough in itself, even if your Committee fail finally to satisfy themselves about results at *Carringtons* which, owing to one cause, or another—principally the insufficient attendance of their staff—they were unable to watch with the necessary care.

(Signed) A. P. MURRAY.

June 6th, 1885.

	JORDANS.	BULKELEYS.	BENTLEYS.
Weight of canes sent to the mill	147,210 lbs.	150,185 lbs.	170,639 lbs.
Percentage of sugar in canes	17.28	16.74	16.51 lbs.
Weight of sugar in canes	25,438 lbs.	25,141 lbs.	28,172 lbs.
Percentage of crude fibre in canes....	12.00	12.00	10.00
Imperial gallons of juice obtained....	7,996	9,000	9,946
Density of juice at 80° Frht.....	1.085=11.6° B.	1.083=11.4° B.	1.081=11.1° B.
Weight of juice obtained	86,756 lbs.	97,470 lbs.	107,516 lbs.
Percentage of juice yielded by mill ..	59	64.9	63.08
Percentage of crystallisable sugar in juice	19.64	19.02	18.35
Weight of crystallisable sugar in juice	17,039 lbs.	18,539 lbs.	19,729 lbs.
Weight of sugar obtained, 1st quality or Muscovado	13,230 lbs.	13,490 lbs.	15,021 lbs.
Weight of sugar obtained, 2nd quality or molasses sugar .....	....	4,148 lbs.	
Wine gallons of molasses obtained ..	525	313	546
Weight of molasses obtained	5,668 lbs.	3,383 lbs.	5,894 lbs.
Do. massecuite obtained	18,898 lbs.	21,021 lbs.	20,915 lbs.
Percentage of sugar obtained in juice.	15.25	18.10	13.97 lbs.
Do. do. do. in canes.	8.98	11.74	8.80
Do. molasses do. in juice.	6.53	3.48	5.48
Do. do. do. in canes.	3.85	2.26	3.45
Percentage of massecuite in canes....	12.83	14.60	12.25
Weight of crystallisable sugar obtained	14,758 lbs.	17,558 lbs.	16,779 lbs.
Loss of crystallisable sugar in juice in manufacture	2,281 lbs.	981 lbs.	2,950 lbs.
Weight of crystallisable sugar obtained as glucose	1,218 lbs.	1,388 lbs.	958 lbs.
Percentage of crystallisable sugar in juice lost in manufacture	13.38	5.29	15.46
Loss of crystallisable sugar in crushing	8,399 lbs.	6,602 lbs.	8,443 lbs.
Total loss of crystallisable sugar	10,680 lbs.	7,583 lbs.	11,394 lbs.
Percentage of loss to total crystallisable sugar in canes	42	30.16	40.47
Number of days occupied in grinding the canes	4½ days.	1 day	1½ days
Weight of coals used in manufacture..	None.	4 tons	None
Manufacturing expenses	£4 11s. 10½d.	£5 18s. 11d.	£4 9s. 5d.

	MANUFACTURED AT JORDANS.				MANUFACTURED AT BENTLEYS.		
	Juice from Mill.	Masseuite from Tayche.	Muscovado Sugar.	Molasses.	Juice from Mill.	Muscovado Sugar.	Molasses.
Crystallisable sugar	19.64	75.20	90.00	50.30	18.35	90.20	54.81
Uncrystallisable sugar ..	.30	11.75	2.37	17.00	.52	2.27	11.33
Ash .....	.25	1.21	.31	2.30	.27	.32	1.49
Moisture	79.44	7.36	4.15	22.50	80.50	3.90	24.94
Unknown organic matters	.37	4.48	3.17	7.90	.36	3.31	7.44
	100.00	100.00	100.00	100.00	100.00	100.00	100.00

	MANUFACTURED AT BULKELEYS.						
	Juice from Mill.	Masseuite from Vacuum Pan.	Crystals No. 1.	Molasses from Crystals.	Masseuite for Molasses Sugar.	Molasses Sugar.	Residual Molasses.
Crystallisable Sugar	19.02	74.60	95.00	49.20	61.60	83.20	38.14
Uncrystallisable Sugar ..	.55	6.82	1.56	14.96	12.79	7.01	28.38
Ash .....	.24	1.41	.17	2.17	2.36	.99	3.62
Moisture	79.60	13.06	.88	22.66	8.12	4.25	14.34
Unknown organic matters	.59	4.11	2.39	11.01	15.13	4.55	15.52
	100.00	100.00	100.00	100.00	100.00	100.00	100.00

J. B. HARRISON, *Island Professor of Chemistry.*

30th May, 1885.

To the Council of the General Agricultural Society of Barbadoes.

Gentlemen,—We, the Committee, appointed by the Council of the General Agricultural Society, to simplify and explain the table of the results obtained by the Society's recent experiments at *Jordans*, *Bentleys*, and *Bulkeleys* estates, beg to submit the following report:—

In estimating the results obtained by the tests carried on at these estates and applying them in favour, or otherwise, of the system of Central Factories for the manufacture of sugar, it must distinctly be borne in mind, that the instruments by means of which these experiments were carried out are most defective and can but approximately show the advantages to be derived from factories. For instance *Bulkeleys* although possessing a good steam mill and vacuum pan, can convey a

very faint idea of a factory, and the saving in every way to be gained by the system. All therefore that our experiments can do is to illustrate in a general way the advantages of improved machinery over old systems, leaving it as an *a fortiori* deduction to the common sense of all to apply the principle of complete factories in general. In the first place then, the object of the Test Committee being to illustrate in a simple manner the advantages to be derived from improved machinery, it is necessary to state the differences in the systems used for sugar manufacture employed in the experiments. At *Jordans* we found the ordinary vertical wind mill and open tayches, the sugar produced there being common muscovado sugar. At *Bentleys* there was a steam mill, steam clarifiers, copper wall, and an aspinwall pan (a filter press being used for the mud from the clarifiers, &c.) At *Bulkeleys* there was a more powerful steam mill, steam clarifiers, copper wall, and a vacuum pan, but neither mud nor filter press. We are, therefore, enabled to institute a comparison between the methods of manufacturing sugar by wind mill and steam engine, and by two systems of machinery, the one being more complete than the other. Another very important fact must also carefully be borne in mind, viz.: the difference in the quality of the sugars produced by these respective estates, and the consequent difference in price.

It will be seen from the table that the amount of canes employed at *Jordans*, *Bulkeleys*, and *Bentleys* was respectively 147,210 lbs., 150,185 lbs., and 170,639 lbs., and we now notice the first point in favour of *Bulkeleys*; for calculating all the estates as each reaping 147,210 lbs., we have *Jordans* yielding 7,996 imperial gallons of juice, *Bentleys* 8,580 and *Bulkeleys* 8,822. Hence in the grinding alone we have a gain of 584 gallons of juice at *Bentleys* and 826 gallons at *Bulkeleys* over the amount yielded by the wind mill at *Jordans*.

Next we notice that the amount of sugar obtained from *Jordans* is 13,230 lbs., from *Bentleys* 15,021 lbs., and from *Bulkeleys* 17,638 lbs., (of which 13,490 lbs. is first quality "Demerara Crystals" and 4,148 lbs. second quality, or molasses sugar.) Here again *Bulkeleys* is prominently to the front. The amount of first quality sugar alone at *Bulkeleys* exceeds the whole amount of muscovado at *Jordans* by 260 lbs., and still has 4,148 lbs. of molasses sugar to its credit. We notice, however, that *Bulkeleys* had 2,975 lbs. of canes more than *Jordans* (of which amount it was estimated that 1,600 lbs. were "rotten canes"). Can this account for the difference of 4,408 lbs. sugar gained by *Bulkeleys*, to say nothing of the difference in the quality of

the production? Again, we notice, that *Bentleys* had originally 20,454 lbs. of canes more than *Bulkeleys*, and that in spite of this *Bulkeleys* surpasses *Bentleys* by 2,617 lbs. of sugar. These are the facts drawn from the experiments and show how much our planters are losing year by year, by adhering to the old fashion process.

Now, with reference to the relative value of the products. Assuming the present market prices, the muscovado would be worth say 16s. 6d. per cwt., the vacuum pan crystals 21s. per cwt., and the molasses sugar about 14s. The muscovado and molasses sugar being subject to loss by drainage, which at a fair estimate amounts to 10 per cent., a deduction of this amount must be made from the weights of these sugars. The muscovado molasses fetched in the local market 12 cents per gallon, the *Bulkeleys* molasses fetched 8 cents per gallon. The total value of the products at *Jordans* will then amount to £100 16s. 6d., at *Bentleys* £113 4s. 6d., and at *Bulkeleys* to £154 19s.; or, calculating on other bases, *Jordan* gives us £40 6s. 7d. per acre, or 30s. 8d. per ton of canes sent to the mill; at *Bentleys* we get £45 5s. 7d. per acre, or 29s. 8d. per ton of canes; at *Bulkeleys* we obtain £61 19s. 6d. per acre, or 46s. 3d. per ton of canes. These figures show in round numbers an increase of 50 per cent. in the value of the products manufactured by the vacuum pan process. An important consideration now comes in, viz.: the relative expense of the different processes. We find that at *Jordans* the expense of grinding the canes and making the sugar amounted to £4 10s. 10½d., or to 1s. 4½d. per ton of canes, at *Bentleys* to £4 9s. 5d., or to 1s. 2d. per ton of canes, and at *Bulkeleys* to £12 18s. 10d., or 3s. 10d. per ton of canes, of which no less than £7, or 2s. 1d. per ton of canes, is for extra fuel—an item which we venture to remind the Council does not appear in the accounts of the best constructed modern factories. Deducting these expenses, we get the estimated value of the products at *Jordans* to be 29s. 3½d., at *Bentleys* 28s., and at *Bulkeleys* to 42s. 5d. per ton of cane, thus showing in round numbers, an increase of 46 per cent. in favour of the vacuum pan process.

Hoping that these remarks may tend to elucidate the data given in the tables.

We have the honour to be, Gentlemen,

Your obedient Servants

J. B. HARRISON,

G. LAURIE PILE.

CHARLES PACKER BOWEN.

July 2nd 1885.

Government Laboratory,
Barbados, *May 30th, 1885.*

Composition of "air dried refuse cake" from the filter press at *Bentley's* estate, taken by myself from press on April 27th.

Moisture	14.76
L. Organic Matter	66.93
Sand and Silicia	3.20
Tricalcium Phosphate	12.95
Iron Peroxide and Alumina ...	.92
B. Alkaline Salts, Calcium, Carbonate, &c.,....	1.24
	<hr/> 100.00 <hr/>
L. Contains Nitrogen.....	2.07
Equal to Ammonia	2.51
B. Contains Potash.....	.12

The juice running from the filter press contained—

1st charge 18.30 per cent. crystalline sugar.

2nd do 18.71 do. do. do.

J. B. HARRISON,
Island Professor of Chemistry.

Government Laboratory,
Barbadoes, *May 30th, 1885.*

Result of experimental grinding of Elephant Canes at *Bentleys*, April 27th.

The Elephant Canes weighted at the rate of 33 tons 14 cwt. 3 qrs. per acre, and gave in a mill, which returned 30 per cent. of megass with ordinary canes, 37-50 per cent. of megass.

The juice had a density of 9.3° Baume, and contained 14.22 per cent of crystalline sugar.

J. B. HARRISON,
Island Professor of Chemistry.

MR. QUINTIN HOGG.

IN the London weekly, *The Citizen*, has appeared, from time to time, some interesting sketches of "Famous Londoners." The following account of Mr. Quintin Hogg is taken from a recent issue. The writer of this account might have added that Mr. Quintin Hogg is probably the largest proprietor of sugar estates in our West India Colonies; and that the present prominent position which British Guiana occupies as a sugar growing colony, is largely due to the energy and capital which Mr. Hogg has thrown into this industry:—

One of the glories of the London of our childhood was undoubtedly the Polytechnic Institution in Regent-street. It was the fashion for all the world and his wife to go there—to listen to the lectures, to descend in the diving bell, and to see wonders of all kinds. It was as much a moral show as the wax works of Mrs. Jarley; and perhaps it was not a favourable sign of the times when an institution so innocent and instructive, and so dear to our ingenious youth, languished for want of public support. Since it has become the property of Mr. Quintin Hogg it has become more of a boon to the public—or rather to that large portion of it who belong to the upper strata of the working classes—who have their way to make in the world, and who are to be our masters in the good time coming. It is for them a real university, such as exists nowhere else in the Metropolis—a university with a religious basis; and all the work of a single individual, Mr. Quintin Hogg. At the last prize day, when the Earl of Aberdeen presided and distributed the prizes to the successful students, it was stated that the Institute afternoon classes had been attended by young men living as far as Oxford, while the evening classes gathered their students from the Metropolis itself, and a very wide range of the outlying districts, such as Barnes, Mortlake, Putney, Leytonstone, Battersea, Camberwell, Highgate, and elsewhere. Mr. Hogg declares that he never can look upon the Institute as a success until it has led to the establishment of similar classes not only all over the Metropolis, but in every great industrial centre in the kingdom. His aim is to give the working man a sound technical education. Other nations are doing this, and in some respects were ahead of us in consequence. The Municipality of Paris had taken up

the idea on public grounds, and in Germany the matter was taken in hand by the Government. He sincerely hoped that the value of technical and practical education would be taken up in Board Schools. Another idea of Mr. Hogg's ought to be imprinted on every British father and mother, and that is, the advantage of setting a boy to learn a trade or to master some craft. "What are we to do with our clerks?" is a question no one can answer. They are not wanted at home, and there is no room for them in the colonies. "What is to be done with a boy?" I once asked a City banker. "Make a hole in the ground and put him in," was the somewhat disheartening reply. Mr. Quintin Hogg replies, "Send him to the Polytechnic and make a craftsman of him." It certainly can be no degradation, he contends, to anyone to learn to earn his bread honestly by any handicraft, and a man thus trained has certainly a better chance of getting a living, and is manifestly more independent than any clerk. In these days our young must emigrate, and in the colonies they only want men who know how to use their hands as well as their heads. With such success has Mr. Hogg stuck to this idea that last year the Institute, as it invariably has done, passed more students at the technical examination than any other college or institute in the United Kingdom—a very creditable fact when we remember that mostly the students are young and of the artisan class, and that they had to contend with others who had much superior advantages, such as the sons of employers or foremen. The total number of individuals attending last year amounted to 5,519, and as nearly all attended more than one class, they represented an issue of class tickets of about 10,000. In the science examinations 83 per cent. were successful, the total number of passes being double that of the previous year. In the technical examination they had won fifteen prize medals. Some classes did exceptionally well. The photographers made a clean sweep of every medal that was offered. The plumbers took the first three medals out of five offered in the ordinary grade. The carriage builders took the first in honours and the second in the ordinary grade. The watchmakers took the first medal in the ordinary grade, and the printers the highest medal given for that subject. The students of the carriage building classes in the competition for prizes offered by the Coachmakers' Company had taken the first prize—silver medal and £3 for the best perspective drawing of a Victoria; second prize—bronze medal and £2, the Company's prize medal for a full-sized drawing of a phaeton; and the Company's certificate and £2 for a

prize essay on carriage draught. Altogether, on the occasion to which I refer, the prize winners were three hundred. The work at the Institute is truly wonderful. On one occasion Mr. Gladstone might well remark that though he did not know much about what was going on inside, he had always been struck by the superabundant vigour and energy which seemed to be pulsating through the place, a place which has already been enlarged by the addition of a neighbouring building, the earnest students being straitened for want of room. It must also be remembered that in connection with the Institute there is a recreation ground at Wimbledon. It is sought as much to develop the bodily as the mental and moral powers of the Polytechnic. Mr. Quintin Hogg may well be honoured for a work such as few even famous Londoners have done. He is to be found as much at the Polytechnic as in his little house just by or in his City office in Rood-lane. He gives to it money, time, thought; he conducts a Bible-class there on the Sunday; he edits the organ of the Institute—*Home Tidings*. I believe in his labour; Mrs. Hogg faithfully co-operates, but he is doing a great work nevertheless. In politics Mr. Hogg is a Radical, and, in spite of his Christianity, of the truest and most practical character, there are men who do not hold him sound in the faith. "I feel," he said on one occasion, "that no man can thoroughly understand his Bible unless he realises that Revelation is progressive, and that in spite of temporary checks and fluctuations, in the long run the prophetic desires grow to be the every-day possessions of their successors. The march of Bible truth is ever onward—from evening to morning, from twilight to noonday—from ignorance to knowledge. When once this is apprehended we shall be in no danger of taking the dim guesses of the earlier prophets for a perfect definition of righteousness, or the gross ideas of God so often figuring the history of Israel as a true representation of the Father. Such a Christianity as he upholds is more attractive at any rate than that of the sects. The elect few who know what the truth is cry out nevertheless. Apparently Mr. Hogg is neither a Churchman nor a Dissenter. Men so Catholic-minded are indeed rare.

As was natural, there were those who thought Mr. Hogg should be an M.P. "Several members," writes Mr. Hogg, "continue to write to me with reference to the constituency of Westminster. It may be not altogether out of place to say that I have altogether abandoned the idea of entering Parliament for the present. I have suffered so much in health during the past twelve months that I felt that I

should not adequately be able to perform my duties if I was elected. I took advantage, therefore, of the opportunity afforded me by the Redistribution Bill not to offer myself for any of the four divisions into which Westminster is to be divided. I did this with great regret, as it involved fresh trouble to those charged with the management of the Liberal interest in that borough, although I had come forward most unwillingly, knowing how fully my time was occupied with existing duties. The fresh relapse in my health, however, left me no option in the matter, as of course it was out of the question for me to diminish the demands on my time and strength in connection with the Polytechnic. The Liberal prospects in Westminster are certainly much improved as compared with what they were two years ago, and I think the party are almost sure of one seat, and will probably win two out of the four just granted. I hope those who had so kindly offered to assist me will transfer their services to whomsoever may be selected to fill my place."

Let me now say a word or two about Mr. Hogg, who is a brother of the chairman of the Metropolitan Board of Works, whom in few things he seems to resemble. Personally they are very different individuals, and there is no danger of mistaking the one for the other, Sir James is tall and grey, Mr. Quintin is not tall, and has very black eyes and hair, and has a wonderfully bright and pleasant expression of face. His father was, as most of us remember, an M.P. and a director of the East India Company. Mr. Quintin Hogg was born in London in 1845, and was sent to Eton, where he remained till his education was complete. At Eton there were many lads who have since, one way or another, become famous in the world, such as the Duke of Marlborough, Lord Randolph Churchill, the Earl of Rosebery, and the Marquis of Lorne; but his chief friends were the Marquis of Lorne and the Hon. Mr. Kinnaird. In 1863 he left the pleasant playground and ancient halls of Eton for the City. With a view to a mercantile career, he was placed with Messrs. W. J. and H. Thompson, tea brokers, with the intention of going out to China and Japan. But ultimately he joined the firm of Bosanquet and Curtis—an old firm which had been over a century in the West India trade—whose business is still conducted in Rood-lane, under the title of Hogg and Curtis; and as the head of the house he has frequently visited the West Indies, and thus in the course of his wanderings may be said to have seen not a little of the world. In 1874 he married a daughter of the late Mr. Graham, then M.P. for Glasgow.

Directly he left Eton he commenced his philanthropic career by teaching in a ragged school somewhere near where now stands the Charing Cross Hotel. About the same time he was much interested in the state of the shoeblacks, and was the first to found a boys' home for such, which is now under the care of a committee, of which the Hon. Mr. Pelham is chairman. He began about twenty years ago in a street near Covent Garden, the work which he has seen grow into the magnificent institute at the Polytechnic, where he has saved many of our young men from going to the bad, and has made them a blessing in their day and generation as first-rate artisans and as Christian workers in many ways. Thus between business and philanthropy he may be said to have spent all his life; a life not long if we reckon by years, but crowded with useful deeds, and destined to be remembered. When such are the lives of our City merchants, London has little to fear, and may trust its honour safely in their hands.

SUGAR "TRADE'S UNION" AT MAGDEBURG.

The *Deutsche Zuckerindustrie* gives the following account of the Union for protecting the interests of the Sugar Trade of Germany:—

With regard to this union, which is also called by some, the Magdeburgh Syndicate, or the "Hausse-Consortium" (? *Corner-clique*), we have up to now read and heard so much that is erroneous, that a few short corrections cannot be out of place.

And, firstly, people have been making merry over the funds of the Union, by comparing the million marks or so which may be at its disposal, with the gigantic task of "bulling" in the world's markets an article of such magnitude as sugar. But the object of the Union is not to run up the prices of sugar artificially, but to protect it against artificial depression, such as was brought to bear a year ago for months together to the great injury of our industry. Already at that time we made a proposal for a combination against the depreciation of sugar, to be supported in its operations by a guarantee fund entered into by the manufacturers. Such a guarantee fund is supplied by the sums contributed by the members of the Magdeburgh Union, and even if these should only amount to one million, (the

actual amount is not known to us, though we have reason to suppose that it exceeds this), it will not be disputed, that with such a guarantee very considerable purchases of sugar can be made, for there is no want of opportunity to raise money on such purchases, on the contrary, bankers are very pressing with offers of such loans.

From this it follows, that the subscriptions to the Union can by no means be regarded as lost money, as is so often the case. In pursuit of its object the Union intends only to operate by purchasing, when the price seems to it as temporarily too low, whether in consequence of operations for a fall, or forced sales, or unusually large quantities offering, &c., and it will further always avail itself of chances of disposing favourably of its purchases, and by favourably is to be understood not only selling at a better price, but by preference to a bona fide, more especially a foreign purchaser. It is in this way, according to the information we have received, that the Union has proceeded hitherto, and the operations carried on up to now have not only attained the principal object of exercising a favourable influence on the market, but have also resulted in a slight profit.

It is also an erroneous impression that by becoming a member of the Union there is any obligation to deal with the banking house of F. A. Neubauer, at Magdeburg, which is intrusted with its operations. This is in no way the case; every manufactory joining the Union remains just as free and independent as it was before with regard to its sales of sugar, raising of loans, providing funds, &c.

It is not possible just now to foresee what course the movements of the sugar market will take, but it would be undoubtedly greatly to be desired that their development may be such that the Union shall have no inducement to operate at all. But if this course should again become necessary, then its action, and we must add the mere influence of its existence, will become all the more effective, the stronger it is. And for this reason we once more recommend our friends to join.

The Mauritius *Merchants and Planter's Gazette* says, there is no improvement to report in the weather, which continues unfavourable to manipulation. The juice is still poor; but it is not possible to delay further cane cutting, for the season is advancing rapidly. Almost all the factories are now (September 18th) in full operation.

THE EXPORT DUTY IN JAVA.

The following is of interest, if only for the statement it contains, that in the opinion of the Dutch Colonial Minister, Java sugar, D. S. 14, is fully remunerative to the planter at between 8 guilders per picul :—

At 11·80 exchange, 8 guilders = 13s. 7d. }	Mean 14s. 5d. per picul of
„ „ 9 „ = 15s. 3d. }	133lbs., or 12s. 1d. per cwt.
The present value here of D. S. 14 is about.....	£0 17 6
From this has to be deducted, freight say....	£0 2 0
2½ per cent. discount, insurance, loss in	
weight, 1 month's interest 5 per cent.,	
which comes to, at least.....	0 1 9
Export duty,* fire insurance and sundries	0 0 8
Total charges from time of shipment to completion of	
the transaction	0 4 5
Leaving net to the planter.....	0 13 1

Or 1s. per cwt. above that which it is stated is fully remunerative.

In December last the price of No. 14 was 13s. 9d. to 14s. *Ed. S. C.*

The Amsterdam correspondent of the *London and China Telegraph* summarises in that journal the reply of the Dutch Minister of the colonies to the petition forwarded to him in May last by several banking and commercial firms in the Dutch commercial capital, praying for an abolition of the export duty imposed in Java on sugar, coffee, and tea, and of the land rent of 25 guilders per acre for the free cultivation of sugar, and also asking for a reduction of the railway tariff. The matter was discussed in both the Dutch Chambers, and the Minister promised an investigation. The report which he has now published shows that the Government is disinclined to comply with the request of the petitioners regarding the abolition of the export duty and reduction of the railway tariff. The Minister has made a minute investigation, the result of which has convinced him that an average price of eight to nine guilders per picul for sugar of quality No. 14 is fully remunerative, and it is very probable that this average price will be exceeded in future. The abolition of the export duty on sugar, which is only 18 cents per picul, is considered

● * The export duty is equal to 3 pence per cwt.

to be unnecessary, this small item being easily included in the cost of production. It is also deemed inadvisable to reduce the tariff of the Government railroads. Abolition of the land rent for the free cultivation would involve a total loss of the profits which the Government derives from the contractors. Although the Minister considers the position of the sugar industry not so unfavourable as has been reported, he agrees with the petitioners that the present tariff of duties requires revision, and he has presented a Bill to that effect to the States General; a reduction of duty in coffee and tea being also included. The Minister concludes that a more solid financial basis for sugar cultivation and other agricultural undertakings is urgently required. He further disapproves the system of granting advances to growers by financial institutions, the disastrous result of which is but too well known as leading to financial crises, and he recommends cultivation by companies, working with their own capital. Under present circumstances this change could be easily introduced. The recent advances in the price of sugar and the latest Java reports, stating that with improved machinery sugar can be produced there at a sufficiently low cost to leave a good profit, are referred to as proving the justice of the Minister's conclusions.

AUSTRIAN SUGARS.

Extract from the *Prager Zuckermark*, of the 21st October:—

For some time already British Refiners are complaining of rather inferior deliveries, especially of Austrian beet first running, and consequently Austrian sugars, if not on samples, are always valued less than sugar of other countries.

An explanation is given us to-day by a letter accompanied by a sample of a parcel of 500 bags just rejected by the London Beetroot Sugar Association, which had been delivered by a Prague house to a British Refiner as Bohemian first running sugar, whereas this parcel is nothing but a quite inferior Osmose second running sugar. We are surprised at the impudence, in daring to deliver such sugar as pure first running sugar, and to damage thereby seriously not only the reputation of the Prague exporters, but also the whole Austrian sugar trade, which has to struggle already sufficiently for its existence.

LANCASHIRE SUGAR REFINERS AND THE COMMISSION ON DEPRESSION OF TRADE.

The Lancashire Sugar Refiners' Association, as part of the Liverpool Chamber of Commerce, have furnished replies relating to their own industry to the questions sent to that Chamber by the Commission on Trade Depression. They say that the market for their sugar is principally at home. Export of British refined sugar is very seriously affected by bounties on export given by foreign Governments to their sugar refiners, and which, indeed, it may be said to a great extent close the world's markets to the British refiner. What little is exported goes chiefly to the Mediterranean. Since 1880 the volume of trade has somewhat increased; its gross value and net profit have decreased, whilst the amount of capital invested and the quantity of labour employed remains about the same. The sugar refining industry may fairly be described as "depressed." During the last twenty years sugar refining in the district covered by the Association has suffered from foreign bounties. The manufacturer of loaf sugar has been extinguished for at least ten years, and that of moist sugar is suffering the most acutely at the present time. The progress of the depression has been somewhat irregular. Any prosperity the industry has enjoyed has been due to the increase of consumption consequent on the reduction and abolition of the duty. Its future depends upon the action of foreign Governments regarding the drawbacks and bounties on exportation.

The rate of wages is above the average of the past twenty years, whilst the quantity and quality of the work are about the same both as regards skilled and unskilled labour.

As to what measures could, in their opinion, be adopted to improve the existing condition of trade, the Association say the refining trade suffers from a large importation of bounty-fed refined sugar. This condition might be met by diplomatic action; failing this, by legislation in the form of a countervailing duty. In conclusion, the Lancashire sugar refiners state they do not object to legitimate foreign competition, but if hostile tariffs were ameliorated, and more especially foreign bounties abolished, the increase in their industry would be very great.

HISTORY OF ADVERTISING.

On 23rd October, at a Meeting of the Balloon Society at the Royal Aquarium, Mr. W. H. Le Fevre as the chairman, Mr. Henry Sell delivered a lecture on "Advertisements and Advertising, and their Relation to commerce." The lecturer began by calling attention to the antiquity of advertising, and to its origin in the necessity of human beings finding means of communicating their wants and the business they had on hand to those near and remote. He spoke of circus notices in old Rome, and of the written bills which were found on the walls of Pompeii when it was disinterred, and then went on to speak of the great change which the invention of printing made in everything in which man was engaged. He traced the history of newspapers, and showed that, in the earliest of them, advertisements had place, and spoke of the probability of the earliest English advertisements, as we now know advertisements, having appeared in the years of Cromwell's Protectorate; one generally supposed to be the first relating to a panegyricol poem on Cromwell's return from Ireland. After further referring to the history of the Press and the stamp duty on newspapers, the lecturer said there was at the same time a tax on advertisements, each separate advertisement having to bear a tax of 3s. 6d. It was difficult to make out how, with these imposts, papers could live at all. It was evident that they must be dear, and the purchase of them very limited. The need for cheaper papers, and the increased interest in public affairs led to a movement which resulted in the abolition of taxes on knowledge, as they were called. The penny paper was the immediate consequence; and, to note one instance, the circulation of the *Daily News* jumped up from about 50,000 to upwards of 150,000 within a week. The lecturer exhibited by figures the effect which the increased circulation had on advertisers, and, of course, on the value of newspapers. He showed that in a day in 1832 the *Times* contained only 121 advertisements; that one day in 1844 the number was 1,400; in 1855 it had risen to 2,122; and that 10 years after it had risen again—to 2,502. He pointed out that one of the morning papers, the advertisements appearing in which he had counted, and which numbered 2179, would, if the old advertisement tax existed, have had to pay no less a sum than £380 a day. The lecturer proceeded to speak of the enormous revenues which newspapers now receive from advertisements, and said to that we owed the fact that the proprietors were able to secure and reward adequately the services of so many special correspondents, and able writers of all classes. He showed how vast an influence this business had on our commerce; and how, as a means of getting business, our advertisers addressed people in all, even the most remote parts of the world. The lecturer was attentively listened to, and at the close a vote of thanks to him was passed unanimously.

THE REPORT OF THE ENSILAGE COMMISSION.

The Private Ensilage Commission has presented the following preliminary report to the Agricultural Department:—

The Commissioners have, up to the present time, held eleven sittings, and examined 38 witnesses, comprising amongst their number owners and occupiers of landed estates and their agents, tenant farmers, designers and inventors of different forms of silos, or of different systems of applying the necessary weights to stacked or ensiled green fodder, chemists, and authors of pamphlets on the general subject. They have also had the advantage of hearing the views of Sir John Bennett Lawes, whose eminent knowledge of all matters relating to the chemistry of agriculture, combined with the fact that his published opinions on the process of ensilage have been regarded as unfavourable to the system, has rendered his evidence of great value and interest.

The Commissioners have by no means desired to exclude unfavourable evidence; on the contrary, they have endeavoured to induce some of those who were believed to be opposed to the system to give them the benefit of their opinions, but they have so far heard no expression of any decidedly unfavourable views. The evidence tendered has been entirely voluntary, all witnesses attending at their own expense.

The evidence of all those who have practically tested the various methods of converting green fodder crops into preserved food for animals without putting them through any process of drying, such as is necessary in the making of hay, has, without exception, established their claims to a considerable amount of success; and, although in some cases, the results have been evidently more satisfactory than in others, the advantages which the different operators, one and all, have claimed for their systems seem to show that a nourishing and useful food for animals can be preserved, independently of any drying process, within wide lines of divergence in the details of the methods adopted.

It has been conclusively shown that, by different degrees of weighting and of expulsion and exclusion of atmospheric air from the material stacked or ensiled, different degrees of heat and of consequent chemical change are produced.

The degree to which such chemical changes increase or diminish the feeding value of the silage itself or its relative value in comparison to the green crop, is, in the present state of knowledge, in great measure a matter of opinion, and careful feeding experiments conducted with a view to test the exact effect of these changes will be highly important to a solution of this question.

Silage which has been covered in immediately after cutting, and not again uncovered, has been shown to retain its colour and freshness, although developing small quantities of certain acids indicative of a process of fermentation without any considerable accession of heat. Other silage, which has been put in at intervals, and from which the air has not been immediately or entirely excluded, has undoubtedly developed considerable heat, and in this case the colouring matter of the leaves has been less well preserved. Yet in both cases a useful feeding material has been rendered available, which, in unfavourable weather, would have been practically lost if any attempt had been made to convert it into hay.

Bearing in mind the importance of economy, the Commissioners have inquired into the efficiency of various systems of stacking unchaffed green fodder crops without drying, by which it has been contended that, with a proper system of pressure, the necessity for a silo can be done away with.

The Commissioners are not at present prepared to express any opinion upon the economy of any such system, or to compare its advantages with those which are claimed by the advocates of chaffed and close stored silage; but it seems to be established that a temperature sufficiently high to involve danger of fire can be controlled by a proper and efficient system of applying weight to the stack of green fodder.

The different systems of applying weight have greatly occupied the attention of the Commissioners; but, as the quality of the silage does not appear to be materially affected by this question, it becomes simply one of economy, and may safely, for the present, be left to each operator to decide for himself according to the special circumstances affecting the particular locality in which his farm is situated.

Some of the best samples of chaffed silage have been produced with pressure not exceeding 70 lb. per superficial foot, but the degree to which weighting is necessary or desirable remains to be decided upon the greatest amount of evidence that may become available to us. Good results are claimed to have been obtained by means of weights

varying from 7 lb. to 300 lb. per superficial foot on the top of the silage.

The experience of dairy farmers does not appear to justify the assertion which has been more or less circulated that dairy produce is, in any way, injuriously affected by silage as food; on the contrary, much valuable evidence has been received to show that the feeding of cows with well-made silage distinctly improves the yield of milk and cream, and the quality of butter.

Where complaints have arisen of milk becoming tainted, the cause has been, in our opinion, traceable to its having been in proximity with strong smelling silage, or with persons who have handled it, rather than to use of such material as food.

The Commissioners have already heard sufficient evidence to justify them in encouraging the development of the system of storing undried green fodder crops as a valuable auxiliary to farm practice. In addition to other advantages, the losses occurring through weather unfavourable for haymaking, may be avoided, and some crops not hitherto grown in this country on account of the impossibility of ripening their seed (such as certain varieties of maize), may probably be successfully cultivated in certain districts, to the increase of our present means of feeding various kinds of live stock on arable or partly arable farms.

WALSINGHAM (Chairman).

H. A. BRASSEY.

A. M. CARDWELL.

DROGHEDA.

N. ECKERSLEY.

EGERTON OF TATTON.

J. S. GATHORN-HARDY.

WM. J. HARRIS.

MITCHELL HENRY.

JAMES HOWARD.

H. KAINS-JACKSON.

NIGEL KINGSCOTE.

C. DE L. FAUNCE DE LAUNE.

J. C. LAWRENCE.

PETER MC. LAGAN.

FREDK. MARSHALL.

HENRY ROBINSON.

STANHOPE TOLLEMACHE.

JACOB WILSON.

August 5.

The export of sugar from Russia during the current sugar season has amounted to 300,000 poods (4,823 tons); and a further export of 400,000 poods (6,430 tons) is expected. So far, Italy has been the chief market. A few firms have sent considerable sample lots to this country. ●

MR. JOHN BRIGHT, M.P., AND THE SUGAR QUESTION.

The following correspondence has taken place between the Secretary of the Workmen's National Association for the Abolition of Foreign Sugar Bounties and Mr. John Bright, M.P.:—

WORKMEN'S NATIONAL ASSOCIATION FOR THE ABOLITION OF
FOREIGN SUGAR BOUNTIES.

Central Committee Rooms, Trafalgar Hotel,
Leman-street, Whitechapel, E.,
September 12, 1885.

DEAR SIR,—I am desired by the committee of the above association to respectfully draw your attention to the sad condition of many hundreds of their fellow-workmen who have lately been discharged from their employment in the various sugar centres of the association. The workmen affected believe that this state of things is entirely due to the action of foreign governments in granting money subsidies upon the exportation of sugar to this country. The workmen further believe that if this system is allowed to continue much longer it must result in the utter destruction of their industry. To show you that their fears are not without foundation allow me to point out to you that in Bristol to-day there are not more than about 120 men engaged inside the walls of a sugar refinery, yet 15 years ago, when our consumption of sugar was not much more than one-half of the present consumption, we had in Bristol about 1,400 men working, and earning wages within the walls of sugar refineries. This is the same *pro ratio* state of things in our other seaport towns. As a further illustration of the evil effects of this bounty system upon our home labour, it was stated by the delegates from Nottingham and Derby upon the occasion of the late national deputation to the present Prime Minister, "that over six hundred skilled artisans engaged in the construction of sugar machinery had been discharged from their employment in each town during the present year." This the delegates attributed solely to the bounty system.

I am appointed to attend a meeting of the out of work people, to be held in Bristol on Tuesday next, notice of which I enclose, and I respectfully ask you is there, can there be anything done for these men who are now suffering through no fault of their own, but through circumstances over which they have not the slightest control.

Many persons have different opinions of what should be done to meet this bounty system of the foreigners. I have carefully abstained from any debateable matter in this letter, having only laid before you the facts of the case, and I, on behalf of my fellow workers, ask you most beseechingly, can there be anything done to meet this unfair advantage taken of us by our foreign competitors, or can there be anything done to alleviate the sufferings of the men, their wives, and families?—I have the honour to be, Sir, your very humble servant,

SAMUEL PETERS.

Right Hon. John Bright, M.P.

P.S.—I also beg to enclose for your perusal report of our deputation to Germany, which took place this last year, our object being to ascertain the feeling of the German people upon this bounty question.—Yours truly,

SAMUEL PETERS.

One Ash, Rochdale, September 15th, 1885.

DEAR SIR,—I will not write a long reply to your letter, but will refer you to Sir Thomas Farrer's work on "Free Trade v. Fair Trade," published by Cassell & Co., London, and especially to the part beginning at page 177, dealing with the sugar question. If this will not inform and convince you, nothing I can say will be of service.—I am, respectfully,

JOHN BRIGHT.

Mr. Samuel Peters, Trafalgar Hotel,

Whitechapel, E., London.

Central Committee Rooms, Trafalgar Hotel,

Leman-street, Whitechapel, E., Sept. 26, 1885.

DEAR SIR,—I beg to thank you for your reply of the 15th inst., in which you refer me to Sir T. Farrer's chapter on Sugar. This I read with interest, but I do not find in it the answer to my complaint. Sir T. Farrer gives a good description of the magnitude of the sugar trade, which he seems to regard as second only to the trade in Corn. He then points out the nature and extent of the bounties by means of which foreign producers are protected on British markets, and most truly defines the effect of these bounties to be "glut, collapse and ruin." This is a full admission of my case. But he then proceeds to say that British Sugar Refiners and the British West Indies, though they are the principal sufferers by these bounties, do not participate in the general "glut, collapse and ruin," but on the contrary, are in a most prosperous condition. Moreover, they are, he contends, but

very small interests compared with the British consumers. Perish the trade so long as the consumer can get cheap sugar. This might be a very good principle if there were any sense in it, and if it were not in direct contradiction to his previous statements. How, I ask, can the consumer get cheap sugar, when the trade has perished? Sir Thomas Farrer declares the result of bounties to be "glut, collapse and ruin," and yet he maintains that the consumer reaps from "glut, collapse and ruin,"—the benefit of cheap sugar.

The fact is, Sir, that this chapter on Sugar admits my whole contention. The protection by bounties has, as I complain, brought about "glut, collapse and ruin," and "collapse and ruin" will most certainly make sugar as unnaturally dear as it is now unnaturally cheap. Her Majesty's Government has for the last twenty years tried to deprive the consumer of unnaturally cheap sugar by obtaining the abolition of these bounties. As these efforts have been unsuccessful, it would be perfectly sound policy, and, as the *Spectator* says, a policy not only consistent with Free Trade, but absolutely conceived in the interests of Free Trade, to remove the bounty by a countervailing duty. All sugar would then come in on free and equal terms, and our revenue would get the benefit of the bounty.

The only objection worth notice which Sir Thomas Farrer makes to this policy, is that it would contravene the "most favoured nation treatment" article in our commercial treaties. This is a disputed point. Many good lawyers say that it would not do so. It is quite clear that the intention was to put all nations on an equality, and that those who give bounties have themselves destroyed the equality. We profess to give equal treatment under equal conditions. But to treat equally sugar which brings with it the protection of a bounty and sugar which has no such protection, does not carry out this intention, but, on the contrary, destroys the equality we profess to secure.

As to countervailing a bounty being retaliation, this is so manifestly erroneous that it is unnecessary to do more than point out the gross unfairness of such an assumption. Countervailing a bounty is simply collecting the bounty and putting it in the national exchequer for the benefit of the taxpayers.

Again, it is equally unfair to try to make the readers of this chapter on sugar believe that anyone ever proposed to prohibit the importation of foreign refined sugar. If the bounty is countervailed, foreign refined sugar will be just as free to come in as if there were no bounty.

Another of the many misrepresentations in this chapter is that the consumer gets the full benefit of the bounty on foreign refined sugar. This is all nonsense, as anyone can see who thinks a moment. The consumer, of course, only gets that small fraction of the bounty which enables the foreign refiner to undersell the British refiner. Directly the foreigner sells below cost price, even by a penny per hundred-weight, he becomes master of the situation. A penny per hundred-weight, or the twenty-eighth part of a farthing a pound, is, therefore, the benefit which the consumer derives from the bounties on foreign refined sugar. The injury from which he will eventually suffer is truly described by Sir Thomas Farrer to be "glut, collapse, and ruin."

I further find that Sir T. Farrer says that bounties on foreign sugar are an undoubted outrage on economic laws, and give to Protectionists an opportunity of masquerading as Free Traders in assailing them. But if they are an outrage on economic laws, why are we not to assail them? I do not understand why we are masquerading when we do so.

Sir T. Farrer says the beet crop has increased from 200,000 to 1,780,000 tons. Last year it was 2,500,000 tons. He says cane increased from 1,200,000 tons in 1853-1858 to 2,000,000 tons in 1882. But all this increase took place before the bounties became so greivous; during the last ten years cane sugar production has not increased.

Sir T. Farrer says sugar is worth £30 per ton; why, Sir, it is not worth more than £20.

Sir T. Farrer says that between 1841 and 1884 slavery was abolished. Is this correct? Was not slavery abolished in 1834 in our colonies, and in Cuba and Brazil, which are amongst the largest cane-sugar-producing countries, it still exists.

Sir Thomas goes on to show that where heavy duties exist on sugar, the price to the consumer is higher than where no such duty exists, and, I believe, most people will agree with him; in fact, I believe no one has ever disputed this, but it has nothing to do with the bounty question.

Sir Thomas then shows that sugar is palatable, and enjoyed by women as well as men, and that the enormously-increased supply of sugar brings increased employment. But what has this got to do with bounties?

There can be no question that sugar will be produced as largely as ever whether bounties exist or not. All that bounties can do is to force one country to produce sugar when it could more economically produce something else, and force other countries to produce some-

thing else when they could more economically produce sugar. He then shows that sugar, as we know, is largely used for jam, but what has this to do with bounties?

Does Sir Thomas mean that our jam makers are dependent on foreign bounties for the carrying on of their industry? The idea is absurd, but what does he mean? Surely, Sir, he argues throughout as if sugar could not be supplied in sufficient quantity except under the system of foreign bounties; this idea is diametrically the reverse of that held by Mr. Cobden, who maintained that the way to obtain the largest supply of any commodity was by abolishing all artificial stimulants, and leaving production to run in its natural channels.

It is disheartening to workmen who, when suffering through the action of foreign Governments, appeal to you for sympathy and advice, to be referred to a highly-paid Government official, the chief of a Department of State that has consistently misrepresented our case, and when entirely beaten by our arguments has taken to abusing us. May I ask you, sir, therefore once more, as you have referred me to Sir Thomas Farrer, and he admits that bounties are a undoubted outrage on economic laws, whether there is not some means of doing away with this outrage.—I have the honour to be, your humble servant,

SAMUEL PETERS, Secretary.

Right Hon. John Bright, M.P.

To this letter Mr. Bright has declined to reply, comment is needless.

SUGAR AS FOOD FOR STOCK.

In the June *Sugar Cane*, page 297, we gave a paper by Sir J. B. Lawes, which was read before the Royal Agricultural Society of England, on this subject. Sir J. B. Lawes' experience was unfavourable, from an economical point of view, to the use of sugar for cattle feeding. The following letter, addressed to the *Queenslander*, shows that in that Colony it answers well:—

SIR,—I have read in your paper Sir John B. Lawes's experiment, "Sugar as Food for Stock," and as you invite correspondence, I send this letter. Two years ago a two-year-old draught entire of mine, through neglect, got in such low condition that he could hardly stand,

Grass was scarce and dry, and corn, even when well cooked, would pass through his body undigested; besides, he did not care much about boiled corn, and he would not eat cracked corn, as he had a very bad lampas. The horse would drink milk, but as milk also was scarce I tried to make a substitute with sugar and flour dissolved in water. The horse took it, and I gave him five or six times a day one pint of sugar and one of flour dissolved in half a bucket of water. The result was wonderful. In a very few days he began to show a better coat, and to put on flesh, and having taken to boiled corn again—on which I put a sprinkle of sugar—his excrement showed that the corn was perfectly digested. So after a while I knocked off the sugar, and gave him the usual ration of corn and as much dry grass as he could get in the paddock. But very soon I had to return to the sugar, and I kept it up until some rain came to make the grass spring, for I could see the horse falling away and the food passing undigested. After again giving sugar the food was well digested, and the horse improved once more. A year ago I mowed some tussocky grass that was dry and white for several months before cutting. I built the haystack on top of a stable frame without tarpaulin or other covering over it. The hay was not good food then, and is certainly not improved since, and no stock will take a bite unless starved. By wetting this hay with diluted molasses or sugar it is preferred by the horse to good fresh lucerne hay, and if anything they are thriving better on it. The opinion that I have formed of sugar and molasses is this, and that although alone they are not able to sustain life, if fed in conjunction with other food rich in azote they enable the stomach to assimilate the maximum of nutritive matter contained in such food. I believe that roots play the same rôle as sugar when fed in addition to grain, oilcake or other rich food. Every butcher must have noticed that pigs stop fattening when they have no more grass to root, no matter how abundant the animal food fed to them. When water and sugar is added to common milk for infants' use it is to render the same more assimilable, although the amount of nutriment is reduced. Upon runs that have been stocked a long time with sheep we often see in those heavily-grassed plains after a dry spell the sheep and cattle perishing; still the tussocky grass is there yet, and although whitened the nourishment is there all the same, only the stock cannot digest it. It is then that sugar or molasses would be invaluable. I recollect reading in the *Queenslander*

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a few years ago that a squatter in New South Wales, after loosing heavily, saved the remainder of his sheep from dying through bad feed by giving a very small ration of bran or pollard. I am convinced that a far more feasible plan, and quite as good in effect, would be to fence the dam or waterhole, and water the sheep, or cattle, or horses in troughs, and add a small quantity of molasses to the water: this plan would also have the advantage of saving the weak beasts from getting bogged. As I have stated, my experiments on a large scale were confined to horses, but of all the animals that I have tried there was not one that did not prefer water sweetened to pure water. Sir John B. Lawes, in giving the result of his experiment that lentil and bran is to lentil and sugar as twenty-four is to thirty-one, remarks that the pigs left the bran and starch for the sugar, thus proving that not only is it more valuable but more relished. If ever there was a time when molasses was necessary to save losses in stock it is now in the Maranoa district. The best station in Australia will shear only 30,000 instead of the 130,000,000 sheep shorn last year, and the cattle are dying in hundreds in every waterhole, notwithstanding that every man willing to swing an axe is engaged for cutting myall. Travelling is out of the question; they are too far gone, and there are no horses fit for the work, all the best horses having been sent to Yeulba and Dalby to recover, and the rest are kept alive with lucerne, corn, and pumpkins; still the tussocky grass is not done yet, and the best plan would be to give them molasses in water. But let us inquire if it is practicable. We can have lucerne hay, the best, delivered in Roma for £7 per ton; maize and wheat, £10; but molasses, although only the refuse of agricultural produce, is charged £7 per ton from Brisbane for carriage alone; to this add casks and other expenses and you will see that, although the most suitable for our distress, it is the dearest food of all—far more so than the best grain. Why not charge the same price for a full truck of 5 tons as is charged for refuse of boiling-down establishments? If it was carried at, say, £2 per ton to Roma, we would quite willingly give £3 per ton to the sugar-planter; and at £5 per ton delivered in Roma it would be profitable feed to use as a rule, and invaluable at present as a medicine against worms. The most ludicrous aspect of the question is this: that most of the molasses made is thrown away every year as useless, because distilling does not pay. See those tables from Pugh's Almanac:—

			Molasses. Gal.		Rum. Gal.
1875	..	..	438,950	made	343,244
1881	..	..	753,658	„	157,325
1884	..	..	1,071,413	„	144,073

Molasses increasing and rum decreasing! But this year the planter will not make low ration sugar, as it is unsaleable, so the amount of molasses not used will be enormous—and all lost! Considering the large increase in plantations since 1884, I consider that the molasses thrown away this year, if properly utilised, would produce more fat and flesh than all the maize and wheat produced in the colony, and so much wealth will be lost through excessive railway charges. A gentleman who is competent to express an opinion on the subject said to me the other day that half the squatters in the colony were insolvent, and the other half soon would be. I think the sugar planters are not much better, with their standing crop, scarcity of labour, and prices. Now one might help the other if only the matter could be arranged. I am convinced this is the only practicable way to save our stock from dying, for stock will take quicker to sugar than anything else—not excepting bran or corn.

I am, sir, &c.,

F. CALINO.

Mount Abundance, 4th August.

LOSSES AND GAINS OF GERMAN SUGAR COMPANIES, 1884-85.

In our last number, page 549, we gave the gains and losses of some fifteen German Sugar Companies.

The following are taken from the balance sheets for 1884-85 of the different Sugar Factory Companies:—

The *Ottleben* worked, after writing off M. 39.261, with a loss of M. 6195.

„ “*Himfeld*” earned a gross amount of M. 470.604, which only sufficed to cover the working outlay and the tax.

The *Frankenstein*, in Silesia, closed the business year with a surplus of M. 1820, which is carried forward to the new account.

„ *Selser*” paid in the past year for roots M. 365,572, and for root tax M. 426,144. After writing off M. 41,879, for bad debts, &c., the balance was a loss of M. 3992.

„ *Gross Gerau* shows a nett profit of M. 582.

„ *Linden*, near *Hanover*, carry their year's balance of M. 713 to the 1885-86 account.

„ *Bredburg* shows a loss for the year of M. 40,550

„ *Norten* „ „ „ „ M. 91,671

„ *Matchin* „ „ „ „ M. 2,389

„ *Görchen* „ „ „ „ M. 22,222

„ *Klützow* „ „ „ „ M. 117,598

„ *Mattierzoll* „ „ „ „ M. 51,044

„ *Munzel-Holtensee* „ „ „ „ M. 11,931

It is noteworthy that this factory only paid 52 pf. per cwt. for beets.

The *Maingau* shows a loss for the year of M. 51,392

„ *Heilbronn* „ gain „ „ M. 172,380

„ *Dettum* „ „ „ „ M. 1,877

„ *Uelzen* „ „ „ „ M. 693

„ *Münsterberg* „ „ „ „ M. 7,280

which has been deducted from the loss of M. 220,704 of last year.

The *Gilbach* shows a gain for the year of M. 16,546

„ *Bredow* declares a dividend of $1\frac{1}{2}$ per cent.

„ *Brunonia* „ „ „ 12 „
(against 5 % last year.)

„ *Halle* „ „ „ 16 „

„ *Kujavien* (Amsee) „ „ „ 14 „
(against 11 % last year.)

As the German mark answers to our shilling, we do not give the English equivalents.

HARVESTING SUGAR CANE.

GATHERING CANE BY THE TON.

From the *Louisiana Sugar Bowl*.

At the meeting of the Louisiana Sugar Planters' Association, on October 8th, Mr. John Dymond read the following paper, which will be circulated among the planters :—

At the special request of some gentlemen of our Association, I have compiled a few notes concerning harvesting sugar cane by the ton.

No argument is needed to prove that in nearly all kinds of work the most economical results arise from paying exactly in proportion to the work done, and which is commonly called piece work. Levee building, canaling, and ditching and wood chopping are now done in that way, but it has seemed difficult to adapt it to the handling of sugar cane.

The enormous expense of putting canes on our cane carriers has excited much consideration of late years, and the recent introduction of portable railways and the dumping of canes directly on to the cane carriers has afforded some relief, but as this is not general we must endeavour to induce economical results in some other manner.

I gave the matter special attention last season, and handling some 20,000 tons of cane, proved up my conclusions quite satisfactory.

I will state some of these conclusions in the order of their ordinary occurrence :—

An able-bodied man can put 25 tons of cane per day on a cane carrier working continually 12 hours, or six hours on and six hours off, provided the cane be dumped actually at the side of the carrier, so that the man shall not have to carry the cane any distance to speak of.

If the cane be dumped across a breast of 60 feet, say an average of 30 feet from the carrier, the same man cannot put over $12\frac{1}{2}$ tons on the carrier. An average of 30 feet additional would reduce the same man's capacity to six one-fourth tons per day.

This last estimate would place the further canes at 120 feet from the carrier on either side, and for greater distances it will pay better to again load and haul the canes to the carrier than to carry them so far.

From these data it would then seem necessary first to dump all the

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cane possible directly alongside the carrier, next to dump the rest of the cane as near to the carrier as possible, and as a rule at a distance not exceeding 60 feet from the feeding table of the carrier. Dumping at a greater distance may become necessary, but should be avoided if possible.

By careful work canes can be dumped into an almost solid mass. Piling and cording cane is disastrously expensive, and should not be resorted to. It is cheaper to dump at greater distances and to haul and dump again at the carrier.

To apply these figures to a sugar house grinding 200 tons of cane per day of twenty-four hours, and the hauling from the field going on continuously, we should find 100 tons dumped directly at the carrier and being used as dumped, and 100 tons dumped near the carrier for use during the night, and if practicable all of it within 60 feet of the feeding table.

If the work be divided into watches of six hours, and the first watch go on duty at 6 a.m., it should be composed of four first-class men, and they will put 50 tons of cane on the carrier if it be dumped at their feet. The second watch will do the same in the afternoon. The first watch coming on duty at 6 p.m. will now have to be doubled, and then all first class men, and the eight men so selected will put 50 tons of cane on the carrier from 6 to 12 p.m., provided the average distance does not exceed 30 feet; and the second watch doubled will do the same. If there be any difference between the work of the day and of the night, the night work, although with a double watch, will be more difficult. The cane reserved for the night watches should, if practicable, be dumped in about equal quantities on each side of the carrier, and then each night watch should have its side designated, and not be allowed to take a stalk of cane from the other side, for if so done the second watch will have its average distance to carry increased, and cannot supply the mill with its usual force.

As the number of labourers I have named is only about one-half of those usually employed to do the work under consideration, my statements may seem impossible, but they are true and proven by experience, but with the conditions I have named; the canes for the day work were dumped by the side of the carrier, and for the night work not average over 30 feet from the carrier, or say across a breast of 60 feet.

The number of men being so small, they are themselves appalled at

the change, and are readily discouraged, until they find how readily they can perform the work, and knowing as they do, that they are to be paid for just what they do.

The difficulties that present themselves are, first, the fact that the men may fear to engage in the contract.

This can be remedied by guaranteeing the men who take the contract that they shall have standard wages, at least, with the contingent advantage of 25 per cent. more.

If, for instance, standard wages are \$1 per day, five cents. per ton for work during the day, and ten cents. per ton for work during the night, will give the labourer who puts in $12\frac{1}{2}$ tons, say during the forenoon, and $6\frac{1}{4}$ tons during the first half of the night, \$1.25 for his twelve hours work.

The next difficulty that presents itself is that of mill stoppages, and if these were frequent from any cause they would disturb the contract work. It becomes, therefore, desirable to have constant, uniform work, and if this cannot be done, the contract price should be raised enough to protect the contractors.

The next difficulty that presents itself is the danger of thin spots in the feed on the carrier. Any excess in feed can likely be prevented by peremptory orders, and further by the fact that a lumpy feed causes frequent stoppages of the carrier by the man at the clutch wheel, and results in less feed going through the mill than would go were the thick or lumpy spots kept out. Contractors thus quickly learn that it is not to their interest to feed too thickly.

The thin feed is much more difficult to remedy; if any exceptional cause presents itself, such as bad weather, short canes, &c., the men on duty may be unable to keep the supply even. If the contractors take an extra man into their gang they lose their pro rata. If they be furnished with an extra man, free of charge to them, they will want such a man for every conceivable cause.

I know of but one satisfactory remedy for a thin feed, and that is the use of the M'Donald hydraulic pressure regulator. When it is properly used, the thin spots do no harm, and in fact the thinner the feed the better bagasse, and I am not sure that the cane carrier work can be satisfactorily contracted where the device is not used.

I believe I do my fellow planters a service in recommending this device, and in saying that it will nearly pay for itself in one season in the saving that can be made by contracting for the cane carrier

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work, when it is used, it removing the chief obstacle to that system, as any contractors, to make the contract pay, must have but a scant supply of labour, which brings the incidental result of occasional thin spots in the feed.

The next difficulty is that of determining the amount of work done by each watch on the cane carrier. As the cane hauled in daily is not all consumed daily, the weights of the cane hauled in do not give the data necessary to a constant determination of the earnings of the contractors. They could only be settled with when the yard was cleared of cane, and in dry seasons this may not occur during several weeks.

The weight of the canes ground may be obtained by calculating back from the juice obtained on each watch.

To be continued.

THE PATENT INVERT SUGAR COMPANY.

An extraordinary general meeting of the Patent Invert Sugar Company, Limited, has been called, to be held at the company's distillery, 290, Cable-street, Shadwell, for the purpose of considering, and if thought fit, passing resolutions to the effect. "(1) That the articles of association be altered in manner following:—(a) That the following article shall be inserted after article 3, and shall be called article 3a, 'The company may from time to time reduce its capital and may consolidate or sub-divide its shares.' (b) The following article shall be substituted for article 12, namely—'The transfer books shall be closed as and when the directors think fit, for a space not exceeding 30 days in each year.' (c) That article 32 shall be altered by the words 'The company in general meeting thinks fit' being struck out, and the words 'the directors think fit' being substituted therefor. (2) That the capital of the company be reduced from £80,000 to £72,000, and that such reduction be effected by cancelling capital which has been lost or is unrepresented by available assets, to the extent of £1 a share upon each of the 8,000 shares in the company, and that the reduced capital be divided into 80,000 shares of 18s. each credited in the books of the company as fully paid up. (3) That the name of the company be changed to the 'Patent Invert Sugar and Distillery Company, Limited.'"

MONTHLY LIST OF PATENTS.

Communicated by Mr. W. P. THOMPSON, C.E., M.S.C.I.,
Fel.Inst. P.A., Patent Agent, 6, Lord Street, Liverpool; and
323, High Holborn, London, W.C.

ENGLISH.

APPLICATIONS.

10942. J. B. ALLIOTT, London. *Improvements in filter presses and in apparatus connected therewith.* 15th September, 1885.

11618. WALTER THOMSON, JAMES MYLNE, and JAMES B. ALLIOTT, London. *Improvements in apparatus for the expression of juice from the sugar cane.* 29th September, 1885.

AMERICAN.

ABRIDGMENTS.

326149. JOHN F. PORTER, Red Wing, Minnesota. *An evaporating pan.* September 15th, 1885. The pan has a set of movable steam pipes in it at one side, covering half its area, the other side slopes upward to a scum box, and has transverse ridges or plates to prevent currents. The finishing pan is similar in design, but the sloping side is oblique in plan also to the vertical side.

326299. THOMAS F. KRAJEWSKI, New York, N.Y. *Evaporating pan.* September 16th, 1885. A five-chambered steam heating chamber is formed in one with the pan, which however overlaps it on each side, the steam enters the central longitudinal chamber, and by pipes through the pan passes to the two next chambers; from these it passes by perforations through the dividing partition into the two remaining chambers.

6140. WILLIAM R. LAKE, London. (Communicated by William T. Jebb, Buffalo, New York, U.S.A.) *Improvements in the manufacture of grape sugar or glucose.* 19th May, 1885. The maize grain is steeped and soaked for about 15 hours at 140 degrees Fahr., the water being renewed from time to time, the warm water is drained off, and cold water introduced to toughen the hulls. It is then drained off, and the mass put into a mill in which concentric series of beaters revolve in opposite direction; the starch germs and hulls are now separated by sieves from each other. The starch is ground in a Bogardus mill, and treated with sulphuric acid and water under pressure. The resulting glucose solution is neutralised by carbonate of lime and concentrated.

BELGIAN.

ABRIDGMENTS.

63868. O. PUVREZ, Brussels. *Improved mechanical filter.* 17th January, 1884. The inventor claims: 1st. A new arrangement of filter in which the

filtration proceeds from underneath upwards. 2nd. The property of filtering one or more times in succession from underneath upwards.

64027. J. B. DESMURS, Antwerp. *Improvements in the manufacture of sugar candy.* 2nd February, 1884. The improvement consists in the introduction, during the process of clarifying, of a substance which acts on any foreign matter in the sugar and prevents it from becoming opaque when crystallised.

64135. P. FORMET, Brussels. *Improvements in root cutters.* 12th February, 1884. This root cutter comprises—1st. A funnel-shaped wood or metal box fixed at a convenient height to the wall. 2nd. A plate with a movable bottom turning on pivots. The toothed knives being movable, the beet root, carrots, &c., can be cut any required thickness. The adjustment of the movable plate is effected by moving a handle giving it a backwards and forwards motion describing a quarter of a circle.

64554. RÉAL AINÉ and RÉAL FILS, Antwerp. *Improved filter bag for sugar refining.* 18th March, 1884. The invention consists in using a textile substance called "Ramie" in the manufacture of bags used for the purpose of refining sugar.

64555. RÉAL AINÉ and RÉAL FILS, Antwerp. *Improved method of filtering adapted to the manufacture of sugar.* 18th March, 1884. The invention consists in using a bag for the purpose of sugar refining made from the textile substance called "Ramie," which by reason of its strength and resistance to moisture will stand the wear and tear of long service.

64578. M. PONCIN, Lahestre. *Improved diffusion knife for sugar refineries.* 20th March, 1884. The invention consists—1st. In forming the grooves of the knife obliquely and proportionate to the diameter of the various plates of the root cutters. Thus when in rotary motion the teeth of the knives will be parallel to the axis of the plate, and they will cut successive channels in the beet root without disturbing the original position of the latter. 2nd. In manufacturing the diffusion knife with a steel edge and of varying thicknesses, which are connected by an inclined conductor. This edge gives the grooves the desired depth, and at the same time allows the beet root to maintain its original position.

64591. P. A. DRUELLE, Brussels. *Improvements in the process of extracting sugar from the residues of the first and second processes in the manufacture of beet root sugar.* 1884. The inventor claims the application of the process of purifying residual syrups which formed the object of his former patent, not only by immediately and successively using again the syrups coming from each concentrated portion so as to obtain only the sugar from one process, but working with the residual syrups separately so as to produce sugars of the 1st, 2nd, 3rd, 4th, 5th, 6th, &c., runnings, the concentrated portions

being turbinéd immediately after concentration, or allowed to stand some time before being turbinéd, so as to crystallize.

64609. SOCIÉTÉ ANONYME DES ANCIENS ÉTABLISSEMENTS CAIL, Brussels. *Improved process of diffusion for saccharine matters in filter presses.* 24th March, 1884. This process consists in putting the pulp or cuttings of beet-root or cane or any saccharine matter capable of diffusion into filter presses, then in passing hot or cold water according to the nature of the material under treatment and the length of the operation, through the pulp or cutting enclosed in the filter presses.

64650. G. MALLEBRANCKE, Brussels. *An improved rotary filter.* 27th March, 1884. The rotary filter, which is the object of the present invention, consists of three concentric cylindrical filters which revolve slowly. The cylinder in the centre is made either of perforated sheet metal or similar material, and the two others are formed of a number of movable rods, over which a filtering material is fastened. The juice to be filtered flows first through the sides of the metallic cylinder, and then through the cylinders made of the filtering material. The filtering material is fastened by means of india rubber rings to the rods. The rods are pointed at their ends, so that they fit exactly into corresponding openings, which are bored in the outer plates of the rotary filter.

Patentees of Inventions connected with the production, manufacture, and refining of sugar will find *The Sugar Cane* the best medium for their advertisements.

The Sugar Cane has a wide circulation among planters in all sugar producing countries, as well as among refiners, merchants, commission agents, and brokers, interested in the trade, at home and abroad.

The visible Stocks and floating cargoes, according to the data so far to hand from the principal countries, compare with the two preceding years are as follows:—

	1885.	1884.	1883.
	Tons.	Tons.	Tons.
Germany, 1st September	109,700 ..	18,250 ..	10,250
Austria, 1st September	14,700 ..	54,000 ..	4,350
France, 1st September	171,885 ..	141,540 ..	73,544
Holland, 15th September	27,648 ..	12,346 ..	13,641
Belgium, 1st September.....	48,847 ..	19,460 ..	7,144
England, 3rd October	288,589 ..	264,206 ..	195,955
Floating Cargoes, 6th October	32,787 ..	35,616 ..	42,919
Total in Europe	694,156 ..	545,418 ..	347,803
United States, 23rd September.....	116,683 ..	150,517 ..	98,287
Havana and Matanzas, 18th September.	54,619 ..	52,874 ..	53,661
Total	865,458 ..	748,809 ..	499,751

From Mr. Licht's Circular, 12th October.

IMPORTS (UNITED KINGDOM) OF RAW AND REFINED SUGARS.

JANUARY 1ST TO SEPTEMBER 30TH, 1885.

Board of Trade Returns.

RAW SUGARS.	QUANTITIES.		VALUE.	
	1884.	1885.	1884.	1885.
	Cwts.	Cwts.	£	£
Germany	4,517,186	5,668,150	3,538,530	3,488,141
Holland	179,498	204,429	142,116	141,838
Belgium	404,441	325,582	336,607	224,137
France	61,150	26,213	57,245	21,596
British West Indies & Guiana	2,745,646	2,374,239	2,599,139	1,902,229
British East Indies	825,527	567,568	511,578	290,661
China and Hong Kong	103,647	14,679	71,476	5,644
Mauritius	236,897	182,260	178,953	127,414
Spanish West India Islands	448,332	645,919	346,246	492,925
Brazil	1,200,122	1,115,121	928,375	669,548
Java	2,759,455	3,203,085	2,567,000	2,422,936
Philippine Islands	558,360	312,282	367,252	159,499
Peru	317,206	478,800	279,640	339,822
Other Countries	450,886	485,636	385,763	333,630
Total of Raw Sugars ..	14,811,353	15,603,963	12,309,920	10,620,020
Molasses	358,664	342,042	128,718	119,895
Total Raw Sugars ....	.....	.....	12,438,638	10,739,915
REFINED SUGARS.				
	Cwts.	Cwts.	£	£
Germany	483,626	632,868	519,294	534,060
Holland	991,312	1,005,117	1,086,517	917,869
Belgium	60,430	54,599	72,731	55,252
France	923,902	426,292	1,054,064	402,203
United States	830,309	1,998,188	857,615	1,806,140
Other Countries	22,420	2,185	25,447	1,840
Total of Refined	3,311,999	4,119,249	3,615,668	3,717,364
EXPORTS.				
	Cwts.	Cwts.	£	£
Denmark	165,517	99,338	140,975	76,985
Belgium	78,827	62,022	65,391	4,335
France	146,405	62,414	129,848	47,960
Portugal, Azores, & Madeira	76,051	62,191	64,351	46,346
Italy	177,405	195,904	155,546	140,948
British North America	68,002	16,668	55,537	11,205
Other Countries	287,807	229,190	279,601	176,399
	1,000,014	727,727	891,249	544,158

IMPORTS OF FOREIGN REFINED SUGAR.

• The British Sugar Refiners' Committee furnish us with the following figures, giving the imports of foreign refined sugar for the month of September compared with the corresponding month of last year, and the average monthly imports for the year compared with those of 1883 and 1884, distinguishing the quantities of "Lumps and Leaves" from "other sorts," and giving the separate imports from each country:—

	"LUMPS AND LOAVES."						"OTHER SORTS," Including Crushed Loaf, Granulated, Crystallized, &c.						TOTAL.					
	Monthly Average.			Sept.,			Monthly Average.			Sept.,			Monthly Average.			Sept.,		
	1883.	1884.	1885.	1883.	1884.	1885.	1883.	1884.	1885.	1883.	1884.	1885.	1883.	1884.	1885.	1883.	1884.	1885.
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
	1883.	1884.	1885.	1883.	1884.	1885.	1883.	1884.	1885.	1883.	1884.	1885.	1883.	1884.	1885.	1883.	1884.	1885.
France	3538	2737	1859	2352	3580	4101	2935	457	2801	2801	2801	2801	2352	3580	4101	2935	457	2801
Holland	588	552	880	319	183	193	21	35	279	279	279	279	319	183	193	21	35	279
Germany & Austria	226	962	781	226	962	781	1253	422	422	422	422	422	226	962	781	1253	422	422
Belgium .....	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..
United States .....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Other Countries ..	7023	8014	7814	7023	8014	7814	4948	6866	6866	6866	6866	6866	7023	8014	7814	4948	6866	6866
Total	7023	8014	7814	7023	8014	7814	4948	6866	6866	6866	6866	6866	7023	8014	7814	4948	6866	6866

SUGAR STATISTICS—GREAT BRITAIN.

To OCTOBER 17TH, 1885 AND 1884. IN THOUSANDS OF TONS, TO

	THE NEAREST THOUSAND.		THE NEAREST THOUSAND.		IMPORTS.	
	STOCKS.		DELIVERIES.			
	1885.	1884.	1885.	1884.	1885.	1884.
London	88 ..	92	268 ..	285	267 ..	291
Liverpool ..	111 ..	111	223 ..	222	223 ..	256
Bristol	5 ..	4	39 ..	45	40 ..	42
Clyde	71 ..	46	192 ..	194	213 ..	179
Total ..	275	253	722	746	743	768
	Increase..	22	Decrease..	24	Decrease..	25

SUGAR STATISTICS—UNITED STATES.

(From Messrs. Willett & Hamlin's Circular, New York.)

FOR THE FOUR PRINCIPAL PORTS. IN THOUSANDS OF TONS, TO THE NEAREST THOUSAND. FOR SEPTEMBER 1885 AND 1884.

	STOCKS.		DELIVERIES.		IMPORTS.	
	Oct. 1st,		In Sept.,		In Sept.,	
	1885.	1884.	1885.	1884.	1885.	1884.
New York	68 ..	104	82 ..	59	41 ..	39
Boston	26 ..	29	18 ..	12	11 ..	9
Philadelphia....	6 ..	7	10 ..	12	8 ..	11
Baltimore .....	.. ..	..	.. ..	..	.. ..	..
Total.....	100	140	110	83	60	59
	Decrease..	40	Increase..	27	Increase..	1
Total for the year ..	..	..	896	820	906	899

In the case of Baltimore, where nothing is put down, it means that the Stock, Imports, and Deliveries, do not exceed 500 tons in each case.

ERRATA.—In last month's table page 553, for August read September 1st, and for July read August.

NEW YORK PRICES FOR SUGAR.

From Willett, Hamlin & Co.'s Report, October 15th, 1885.

FAIR REFINING.	96° CENTS.	GRANU- LATED.	STAND. A.	STOCK IN FOUR PORTS.
Oct. 15, 1885.—5 7-16c.	6½c.	6½c.	6½c.	Jan. 1, 1885—89,186 tons.
Oct. 16, 1884.—4½c.	5½c.	6½c.	5½c.	Jan. 1, 1884—60,900 tons.
Oct. 18, 1883.—6½c.	7 11-16c.	8½-11-16c.	8½c.	Jan. 1, 1883—50,297 tons.
Oct. 19, 1882.—7½c.	8 c.	9½c.	8½c.	Jan. 1, 1882—43,927 tons.
Oct. 20, 1881.—8½c.	8½c.	10 c.	9½-¼c.	Jan. 1, 1881—66,999 tons.
Oct. 14, 1880.—7½c.	8½c.	9½c.	9½-¾c.	Jan. 1, 1880—68,558 tons.
Oct. 16, 1879.—6 3-16c.	7 11-16c.	9½c.	8½-9c.	Jan. 1, 1879—50,773 tons.
Oct. 17, 1878.—7½c.	8½c.	9½c.	9 c.	Jan. 1, 1878—48,230 tons.
Oct. 18, 1877.—8½c.	9 15-16c.	10½c.	9½c.	Jan. 1, 1877—25,885 tons.

STOCKS OF SUGAR IN THE CHIEF MARKETS OF EUROPE ON THE
31ST AUGUST, FOR THREE YEARS, IN THOUSANDS
OF TONS, TO THE NEAREST THOUSAND.

Great Britain.	France.	Holland	German Empire.	Austria.	Remaining four principal entrepôts.	TOTAL 1885.	TOTAL 1884.	TOTAL 1883.
307	172	31	110	15	21	656	373	329

CONSUMPTION OF SUGAR IN EUROPE FOR THREE YEARS, ENDING
31ST AUGUST, IN THOUSANDS OF TONS, TO THE
NEAREST THOUSAND.

Great Britain.	France.	Holland	German Empire.	Austria.	Remaining four principal entrepôts.	TOTAL 1885.	TOTAL 1884.	TOTAL 1883.
1206	477	61	399	188	334	2665	2567	2358

ESTIMATED CROP OF BEET ROOT SUGAR ON THE CONTINENT OF EUROPE,
FOR THE PRESENT CAMPAIGN, COMPARED WITH THE ACTUAL CROPS,
OF THE THREE PREVIOUS CAMPAIGNS.

(From *Licht's Monthly Circular*.)

	1885-86.	1884-85.	1883-84.	1882-83.
	Tons.	Tons.	Tons.	Tons.
France.....	*375,000	.. 557,500	.. 445,954	.. 473,001
German Empire	900,000	.. 1,155,000	.. 986,403	.. 848,124
Austro-Hungary....	300,000	.. 307,500	.. 473,676	.. 423,194
Russia and Poland ..	400,000	.. 380,000	.. 307,697	.. 284,991
Belgium	65,000	.. 90,000	.. 106,586	.. 82,723
Holland and other Countries.....	35,000	.. 50,000	.. 40,000	.. 35,000
Total.....	2,075,000	2,540,000	2,360,316	2,147,033

It will be seen from this, Mr. Licht's first estimate of the New Campaign, that the deficiency, as compared with 1884-85 Campaign, will be some 465,000 tons.

* The French experts estimate the production at 250,000 tons—a very important difference.—Ed. S. C.

STATE AND PROSPECTS OF THE ENGLISH SUGAR MARKET.

The present state of the sugar market is an anomalous one. With a strong statistical position, prices are weaker than a month ago, and, in the case of beet, 6d. down. If we compare to-day's quotations with those of June last, when the uncertainty as to the prospects of supply were much greater than now, the decline is from 1s. to 1s. 6d. per cwt.

Mr. Licht, in his *Monthly Circular*, estimates the European crop at 2,075,000, against 2,540,000 for 1884-5, showing a probable deficiency of 465,000 tons. In this estimate Mr. Licht puts the French crop down at 375,000 tons; French experts put it down at 250,000 tons, or 125,000 tons less—a most important difference.

Taking the present estimated European supplies, including stocks on hand, as against the previous year, the figures stand thus:—

	1885-86. Tons.		1884-85. Tons.
Mr. Licht's estimate	2,075,000	....	2,540,000
Deduct difference between the German and French estimates of the French crop }	125,000	....	—
	1,950,000	....	2,540,000
Stocks in Europe.....	694,156	....	545,418
	2,644,156		3,085,418

Thus showing a deficiency in supplies for the coming year of about 440,000 tons. There is nothing in the accounts of the Colonial crops for the next year to indicate that they will be materially greater than the last one; and it is worthy of note that the stocks at the four ports in the United States are some 40,000 tons less than last year.

With such a prospect before us, the absence of spirit in the market is surprising.

The price of beet is now about 14s. 6d. for prompt, and 15s. to 15s. 3d. January to March; cane kinds and refined have been moderately steady throughout the month.

The deliveries up to the 17th October, in the United Kingdom, show a decrease of 23,085 tons, as compared with the same period in 1884; and the imports also show a decrease of 24,321 tons, for same period.

The imports of American refined for the nine months ending September 30th amounted to 99,901 tons, against 41,604 tons for the same period of 1884.

The stocks in the United Kingdom on 17th October were 274,904 tons, against 252,927 tons in 1884, and 196,206 tons in 1883.

Present quotations for the standard qualities, as under, are:—


FLOATING.		Last Month.
Porto Rico, fair to good Refining ..	14/6 to 15/- against	15/- to 15/6.
Cuba Centrifugals, 96% polarization	16/9 to 17/-	16/9 to 17/-.
Cuba Museovados, fair to good Refining..	14/6 to 15/-	14/9 to 15/3.
Bahia, middling to good Brown, No. 7 to 8½	13/- to 14/-	13/- to 14/-.
Pernambuco, good to fine Brown ..	14/- to 14/3	14/- to 14/3.
Java, No. 14 to 15	17/6 to 17/9	17/6 to 17/9.
LANDED.		Last Month.
Madras Cane Jaggery	11/3 to 11/6 against	11/6 to 11/9.
Manilla Cebu and Ilo Ilo	11/3 to 11/6	11/6 to 11/9.
Paris Loaves, f.o.b.	20/6	21/3 to 21/6.
Titlers	21/-	21/3
Tate's Cubes	22/-	22/6
Austrian-German Beetroot, 88% f.o.b. ..	14/6	15/- to 15/3.

THE SUGAR CANE.

No. 197.

DECEMBER 1, 1885.

VOL. XVII.

 The writers alone are responsible for their statements.

N.B.—All communications to be addressed, and Cheques and P.O. Orders made payable to HENRY THORP, Ducie Chambers, 57, Market Street, Manchester.

For Scale of Charges for Advertisements, see page xi.

For Table of Contents, see opposite the last page of each Number

SUGAR REFINING BY ELECTRICITY.—Professor Friend, the inventor, is now in this country, but we are not in a position to report anything beyond this.

Mr. Stade, of Trinidad, (late of Hanover, Germany,) sends us his pamphlet on “The Diffusion Process applied to Sugar Cane,” which, at his desire, we reproduce in the present number (see page 627).

At page 633 will be found the replies of the British Sugar Refiners’ Committee to the questions from the Commission on the Depression of Trade. The Greenock refiners have also, through their Chamber of Commerce, forwarded replies, which are the same in substance as those of the British Refiners’ Committee.

The Russian Bounty Question is again cropping up. The Russian Government agreed, in August last, to give a bounty, equal to about 6s. 3d. per cwt., upon a maximum amount of sugar exported up to January 1st, 1886. This quantity has already been reached. There still remains a large quantity beyond home requirements, as much as, it has been stated, 100,000 tons; and upon this the Government is being urged to extend the bounty—in other words, to hand over to the holders of these sugars some £600,000. Our Refiners’ Committee have been in communication with the Foreign Office on the subject of these bounties (see page 638).

In the October *Sugar Cane* (page 508) we gave a list of sugar

estates in the West Indies which were advertised for sale in the Encumbered Estates Court by Messrs. Hards and Jenkinson.

The Streatham Estate (Montserrat), 1,924 acres, was sold for £1,080, which is the price the same estate realised in 1871.

The Hermitage Estate (Montserrat), 929 acres, sold for £1,075.

The Dank's Estate (Jamaica), 3,616 acres, was sold for £4,000.

The Amity Hall Estate (Jamaica), 629 acres, realised £6,500.

The Bog Estate (Jamaica), 1,120 acres, fetched £4,100.

The Friar's Hill Estate (Antigua), 335 acres, was withdrawn.

In the October *Sugar Cane* we mentioned that a company had been formed, called the "Valley Sugar Company," for the manufacture of beet sugar at White River, Washington. Mr. E. Meeker has been appointed manager, and has instructions to contract with the farmers for 20,000 tons beet per annum for five years, and that he has had promises for 8,000 tons at 18s. per ton. The size of the works to be erected is to be sufficient to turn out 20 tons per day. Mr. Meeker is satisfied from the experience he gained when in Germany, that they can in the States produce beet sugar as cheaply as the Germans. Time will show.

In the October *Sugar Cane* page 514, we gave a report of Mr. J. Owen Alexander, of Cane Crushing in Demerara. The following letter addressed to the *Demerara Argosy*, points out an inaccuracy in the report as we gave it. We have pleasure in re-publishing this letter in the *Sugar Cane*, as desired by Mr. Alexander:—

TO THE EDITOR: "THE DAILY CHRONICLE."

Sir,—In the *Sugar Cane* for this month I see some results of mine are published on *The Average Work of De Willem mill*. Unfortunately in the original report, the average per centage of total sugar in the cane was struck too low. The error was duly corrected, but evidently not before the editor came into possession of the report. The sucrose and glucose in the cane should be 10·18 and 1·16 per cent respectively—making the total sugar 11·34 per cent.; the per centage of sugar extracted from the cane is therefore 88·6 and not 88·78 as shown. "Average gallons juice made per hour," should read 1,023 not 10·23. On the first opportunity I will communicate with the editor of the *Sugar Cane*. In the meantime kindly make the correction through your paper.—I am, Sir, &c.,

J. OWEN ALEXANDER.

"Tuschen de Vrienden." 26th Octr., 1885.

In our last number, page 577, we gave a report of the results of the Barbados experiments, Muscovado *versus* Vacuum Pan. We have since received a letter from the engineer of Bentley's Estate,

who is at the present time in England, calling our attention to what he thinks is a misprint, in respect to the percentage of juice obtained from the Bentley's mill at this trial. He says:—"I find the percentage given is 63·8 per cent. This, I think, is an error, for as the estate's engineer, and present at the time, I find my memorandum gives 70 per cent.; and at a private trial on Brigg's Dagrell Estate the mill then just gave 75 per cent., and on another trial 72 per cent., thereby showing the advantages of the modern and large diameter of roller mills as made by Messrs. G. Fletcher & Co."

We are informed that the combined hand press and corrugated clarifiers, mentioned in the report above alluded to (page 580), are made only by Messrs. Geo. Fletcher & Co., of London and Derby, and that from practical experience this press, it is stated, is found to be far superior to any yet in the market. The clarifiers are so easily cleaned that no acidity takes place, and are quite as effective as the tubular kind, and are found to be a real boon to the planter.

A correspondent writes us, by way of complaint, that whilst the Press is very ready to give prominence to those German Sugar Companies which show a loss upon their year's trading, they withhold, in many cases, any report of those which show a profit. As far as the *Sugar Cane* is concerned, we are careful to give *all*, whether the results are favourable or unfavourable, that come under our notice. These balances refer to the campaign 1884-85, that is from 1st September, 1884, to August 31st, 1885; the average price of beet, 88 $\frac{1}{2}$ ° f.o.b. in these 52 weeks was 12s. 4d. per cwt., the lowest 9s. 7 $\frac{1}{2}$ d. on October 4th, 1884, and the highest 16s. 9d. on May 29th, 1885. Given the result of these balance sheets, we leave our readers to form their own conclusions as to whether beet sugar manufacturing, even at present prices, leaves the splendid margin of profit which some seem wishful to make out that it does.

To the Lists of Losses and Gains of German sugar companies for 1884-5, given in the *Sugar Cane* for October, page 549, and for November, page 603, may be added the following:—

	Marks.
Kruschivitz.....	shows a loss of 80,000
Demmin.....	„ 8,735
Emmerthal.....	„ 9,363
Neuteich.....	„ 8,171
Kosten.....	has covered its working expenses.
Koenigslutter	has lost 246,000 marks on 36,000 tons of beet worked up, or say £3 10s. per ton of sugar.
Seesen,	escapes showing a loss by its shareholders not requiring payment for their beets.
Marienwerder.....	its first campaign, has lost more than 26,000 marks.

LOSSES AND GAINS OF GERMAN SUGAR COMPANIES, 1884-85.

Continued from page 619.

Name of Manufactory.	Beets worked up.		Price paid.		Cost of Working.		Gain.		Loss.	
	Cwts.	Pfening.	Marks.		Marks.		Marks.		Marks.	
Melno	—	—	—		—		—		18,681	
Amelu (Kreis Jülicher)	—	—	—		—		—		158,648	
Baddeckenstedt (Zur Rast)	410,890	95	41 pfg. per cwt.		—		—		106,122	
Pakosch	597,670	108	M. 389,966		—		—		13,174	
Hayman	—	—	—		—		—		28,986	
Nakel	528,890	74 $\frac{1}{2}$	M. 560,895		93		—		—	
Zduny	562,930	95	—		7,656		—		—	
Cologne (Rheinische)	—	—	—		642,858		—		—	
Neustadt (O.S.)	—	—	—		22,660		—		—	
Opaleniza	469,680	93	—		50,146		—		—	
Läbe-i-L. (Lithuania)	341,338	69	M. 131,656		7,155		—		—	

THE UNITED STATES AND THE WEST INDIES.

We have heard little lately of the project of a trade convention between the United States and the West Indies. But the interests on both sides are so vitally concerned in the promotion of such a conventional arrangement as was settled last year on behalf of the West Indies, that we cannot believe that mere technical difficulties originating in our own Foreign Office will be allowed to suspend indefinitely the removal of the fiscal restrictions which now hinder trade between the United States and our West Indian colonies. It is hard for our West Indian sugar industry, that £10 a ton should stand between it and free access to the markets of America. Harder still that when America promotes negotiations with a view to the removal of this heavy duty, our own Foreign Office officials should have raised technical objections which induced Earl Granville to oppose the free trade proposals of the United States.

We have advisedly used the term "technical" in describing the character of the objections raised by the late Administration to the conclusion of a convention such as was settled in draft on the 28th of November 1884, at Washington, between the Government of America and our Minister at Washington, who was assisted by Mr. Neville Lubbock, in the conduct of the negotiations. In order to make clear why we use the term technical to the objections raised in our Foreign Office, we must give in concise detail the nature of the projected convention.

But first let us advert to the situation as it existed when this Convention was mooted last year, a situation without variation at the present time.

It is well known that the effect on the West Indies of the foreign bounties on continental beet sugar is economically analogous to the effect of a hostile differential duty on West Indian sugar entering British ports. If, for the sake of illustration, German sugar had the advantage of an export bounty of say £3 per ton, or of exemption from an import duty by us of £3 per ton, which West Indian sugar in the first case had not, and in the second case was liable to, then it must be obvious that in both cases West Indian sugar would have to provide as an element in cost of production—irrecoverable on the market—£3 per ton. We have referred to the effect of foreign bounties because they probably amount to a general

average disadvantage to the West Indies of about £3 per ton. And yet this differential necessity of providing out of their own pockets the equivalent of a foreign bounty has seriously retarded the development of the West Indian sugar production. But the West Indies had limited access to the American markets because, although £10 per ton was charged on their sugar, that duty was not differential as against the West Indies only, and therefore a great proportion of it was recoverable on the market. Imagine, however, the disastrous effect upon the West Indies, owing to their being excepted from the most-favoured-nation article in our commercial treaty with America, if the American duty upon their sugar of £10 per ton were suddenly to become a purely differential duty by the conclusion of commercial treaties by America enabling Spanish and other foreign sugars to enter duty-free. It is obvious that if the West Indies can barely hold their own on British markets against the hostile protection of £3 per ton bounty, such an amount as a £10 per ton differential duty would prove an absolute prohibition to West India sugar entering the American market. No wonder that last year, when negotiations were on foot between America and Spain respecting commercial arrangements as regards the Spanish Colonies, the *Times*' correspondent at Madrid should have telegraphed an energetic warning to this country to be on the alert in securing equivalent treaty concessions for the British West Indies.

Moreover, Mr. W. E. M. Tomlinson, M.P. for Preston, without any communication on the subject from West Indian interests, had so discerned the danger to the commercial interests of British colonies if they were to be excluded from the markets of America by differential duties, as to induce him to move for papers on these Spanish and American negotiations, and thereupon to bring the whole question before the House of Commons. It is much to be regretted that the culpable apathy of the late Administration upon commercial questions prevented Mr. Tomlinson's efforts to originate a debate.

But the West Indies soon became alive to the dangers of their position, and in the autumn of last year Mr. Neville Lubbock proceeded to Washington, and in a few weeks returned with a draft project of a trade Convention.

The preamble of this draft Convention alleged as its object the establishment of such commercial intercourse between the United States of America on the one hand, and certain of Her Majesty's pos-

sessions in the West Indies and South America, viz., Jamaica, Barbadoes, Trinidad, Antigua, St. Christopher, Nevis, Monserrat, Dominica, Virgin Islands, St. Vincent, St. Lucia, Grenada, Tobago, and British Guiana on the other hand, as should further and develop trade and goodwill to the mutual advantage of their respective citizens and subjects. The project then contained sixteen Articles, which may be concisely condensed as follows:—

ART. I. Admission by United States of 35 articles of West Indian production, including sugar not above 16 Dutch standard (contained in Schedule A) free of duty, and 3 West Indian productions (Schedule B) at a reduction of 25 per cent.

ART. II. Admission by West Indies of 90 productions of the United States comprised in Schedule C, free of duty, and of 11 productions, comprised in Schedule D, at a tariff reduction of 50 per cent., with an exception as regards Jamaica and Trinidad of 6 articles, comprised in Schedule C.

The articles of merchandise comprised in these schedules were to be carried in either British or American vessels.

ART. III. Contained regulations as to proofs of origin.

ART. IV. Provided against export duties, with allowed exceptions, and against differential excise duties as between American and West Indian products.

ART. V. Provided for reciprocal equality between national vessels of either Power in the ports of the other Power, when loaded with national productions, in respect of tonnage municipal or local dues, with exceptions as regards any existing reserved rights of domestic or inter-colonial coasting trade.

ARTS. VI. to X. inclusive contained further navigation provisions as regards vessels not coming within the provisions of Art. V., and limited the terms of the whole Convention as regards national vessels to vessels exclusively owned by citizens of the United States or British subjects.

ART. XI. Provided that each contracting Power was to give to the other the treatment conceded to any third Power freely, if freely granted to such third Power, or for equivalent consideration to that obtained from such third Power.

ART. XII. Provided for liberty to each contracting Power to alter customs tariffs, with right for either party affected by such changes to denounce Convention by six months' notice.

ART. XIII. was in the following words :—

“The contracting parties, however, mutually agree that the conditional privileges which this Convention expressly reserves and confines to the goods and vessels of the respective countries under the national flags are not, under the operation of favoured nation clauses in existing treaties which either of them may have concluded with other countries, to be deemed as extending to the goods or vessels of such other countries without equivalent consideration on the part of such other countries; and if any foreign country should claim, under existing favoured nation engagements, to share in the benefits of the commercial intercourse which this Convention creates as between the United States and the several British Colonies aforesaid, and should either party deem such claim to be allowable, it is hereby engaged that the party affected thereby shall have the right to denounce the present Convention under Article XII. hereof; or else that any such treaty with any foreign country, so far as it may be contrary to the terms of this Convention, may be denounced and terminated so soon as the terms of such treaty may permit, in which case the alternative right of denunciation of the present Convention shall not be exercised.”

ART. XIV. was as follows: “Nothing in this Convention shall be construed as affecting or impairing any rights of commercial intercourse between the United Kingdom of Great Britain and Ireland and the Colonies aforesaid, or between any other possession of Great Britain and said Colonies, or between the said Colonies themselves, which may now or hereafter exist; but it is agreed that in respect of the articles mentioned in the schedules of Articles II. hereof the United States shall be placed on the same footing as Great Britain and her possessions.”

ART. XV. Provided as to ratification by the contracting Powers.

ART. XVI. Provided for the duration of the convention for six years, and until either Power should notify to the other its desire to terminate the convention, and for twelve months from date of such notification. Such duration being subject to provisions as to determination in Articles XII. and XIII.

ART. XVII. Provided as to exchange of ratifications.

It must be borne in mind that this project^a was settled only in draft. It obviously bears the disadvantage of not being reduced to the more precise language of a regular treaty. But the material of agreement

this draft contained was quite sufficient to enable any lawyer to reduce the whole draft to a perfect form of treaty.

We might summarize the whole draft by stating that the object of the Convention was to facilitate commercial intercourse between the British West Indies and British Guiana on the one side, and the United States of America on the other, by reciprocal remission of duties on certain scheduled articles in which remission of duties by the West Indies and British Guiana, the mother country, and all other British Colonies were unconditionally to share, and also all foreign States which gave to the West Indies the equivalent of the terms conceded by the United States.

The Convention also placed British and American shipping engaged in the inter-Colonial and coasting trades on the same terms.

It also provided reciprocal most-favoured-nation treatment between our West Indian and South American possessions on the one side, and the United States on the other, thus terminating, so far as the West Indies and British Guiana were concerned, the injurious effect of the exclusion of British Colonies from most-favoured-nation treatment, as provided by the terms of our present existing commercial treaty with the United States.

Here then was a Conventional arrangement which promoted free trade by reducing import duties; which gave the mother country and all British Colonies every advantage in the ports of the West Indies which was obtainable by the United States; which enabled any foreign country outside the Convention to obtain in the West Indian ports the same treatment as the United States upon giving to the West Indies the concessions, or their equivalents, granted by the United States.

But our Foreign Office, in a despatch by Earl Granville to the British Minister at Washington, on the 12th of February last, raised objections, which, we venture to say, are technical and wanting in substance, and we propose to deal with and thoroughly answer all these objections when concluding this article in our next number.

W. P. B. S.

Lincoln's Inn.

ALVARADO (CALIFORNIA) BEET FACTORY.

Mr. E. H. Dyer, superintendent of the beet sugar factory, Alvarado, Cal., reports that the product of the factory for the month of September was 1,460 barrels of white granulated sugar, aggregating 420,688 pounds (187 tons) net. To produce this 2301·61 tons of beets were worked. The average percentage of sugar realised was 9·1 per cent., and the actual cost of the sugar in barrels, landed in San Francisco, was 4·9c. per pound. In addition to the 9·1 per cent. of white sugar realised from the beets, Superintendent Dyer states there is in the syrup tanks sufficient crystallisable sugar to bring the average percentage for the month up to about 11 per cent. The result is said to be greater than has ever been realised in France or Germany. The cost of white granulated sugar has been reduced by the Standard Refinery at Alvarado, below the cost of a similar product in any other county. This factory is now working about sixty barrels of sugar daily, the quality of which, to say the least, is equal to any granulated sugar ever placed on this market by any refining company. The showing is a remarkable one, and clearly indicates the value of the beet root sugar industry in this State, if larger capital were employed in its development. If a small eighty ton factory can accomplish what has been accomplished at Alvarado, it is fair to presume a two hundred ton factory, with better facilities and improved machinery, would soon place the beet sugar business on a footing to compete successfully with sugar producers in any part of the world.—*California Grocer and Country Merchant*.

We do not doubt the possibility of producing beet sugar in California to a profit, so long as the present high protective duty continues, which is equal to 2 cents per lb.

From the foregoing statement, for which Mr. E. Dyer is made responsible, sugar “the quality of which, to say the least, is equal to any granulated sugar ever placed on this market by any refining company,” can be produced at 4·9 cents per lb., that is, 19/1 per cwt. The present price in New York is about 6½ cents per lb., or say 29/2 per cwt., which upon this showing leaves a margin of over 50 per cent!

Before, however, accepting this statement we should like to see the result of a whole season's working, with all the expenses brought into the account.—Ed. S. C.

THE DIFFUSION PROCESS APPLIED TO SUGAR CANE.

A FACT.

By GEORGE STADE, Trinidad.

It is comparatively but a short time since the introduction of the Robert-Diffusion process in the manufacture of cane sugar has again come to the front, and it seems as if this process has been awakened from the long historical sleep which it has taken since the American trials and the Aska undertaking.

Partly by professional, but mostly by very incompetent quarters have been arrayed the possible and impossible things affecting the probability of its mechanical, technical and chemical success, or still more particularly its—failure; and on these interesting topics have been published essays in papers, in reviews and magazines, concerning which it has been aptly remarked that “those who have scarcely or “ever seen a diffusion battery at work deem themselves privileged to “pronounce the most decided opinion about the matter.”

Therefore, seeing that these opinions have been discussed and published in all tongues of our planet, it may be still more interesting and very agreeable, if not more instructive too, to learn a little more of the absolute facts.

It is to be regretted that the facts are not to be found in B. West Indian annals, neither have the B. West Indians made any efforts to become the pioneers in this matter of the other cane sugar producing countries or colonies; on the contrary, in the opinion of many, too much money has been already wasted in these wicked innovations and so-called “improvements” but I am not concerned to touch this critical and vital question at the present moment.

Now, on the other hand let us look at the real pioneers of the application of the Robert-diffusion process to the cane sugar manufacture, viz., our American and French confrères.

By the active support of the Government of the United States of North America, as well too as by the restless energy of Professor Harvey W. Wiley, in Washington, we are encouraged to hope soon to see definitive results from the large diffusion batteries of the newest and most improved type in Louisiana, which will be on their trial during the running crop (*vide*, the interesting bulletins of the U. S. A. Chemical division of the department of Agriculture: No. 2

Diffusion. Its application to sugar cane, &c., Washington, 1884; No. 5, the sugar industry of the U. S., Washington, 1885;—this last report is, by the way, of predominant importance.

At the same time the Martinique and Guadeloupe Usines are actually working on the solution of this question (*vide*, *Sucrerie indigene et coloniale*, Edmond Riffard, *Traitement, de la Canne à Sucre*, 1883, 1884, &c.

Also of Spain it is known that there have been made since 1883 several experiments with diffusion for sugar cane, and, as a fact, some factories are already working exclusively with this process. However, a quite especial technical report about these manufactories is, as far as I know, not at hand at the present moment.

The newest, unfortunately a little in general written, pamphlet, published by the Compagnie de Fives-Lille—(diffusion à la Canne. Application industrielle à l'usine d'Almeria—Espagne, Campagne 1885. Paris, Imprimerie Chaix)—will be given later on. It contains a good deal of information about the question, and in spite of all, duly deserves to be noticed.

On the island of Malaga too, diffusion is lately introduced (1884), but there only applied to the megass coming from the mills. This is not quite new and has been tried and given up already elsewhere several times.

Even the Sandwich Islands (*vide*, *Sugar Bowl and Farm Journal*, April, etc., 1885), each and all are seeking to be the first to increase the dividends of their enormous capitals. Yet unfortunately there are obstacles chiefly of a local nature which militate against the realisation of their good intentions, such as the water supply which (so on Waianae) must ever be thoroughly considered.

In Brazil too, the success of the diffusion process will soon become the topic of the day amongst sugar producers, as all eyes are directed to the experimental station, which is complete now and intends to start cutting this crop. The report of Mr. Hans Nitzsch, the technical director of the Central Factory, Barcelos, gives in the leading German paper (*Die Deutsche Zuckerindustrie*, 1885, p. 759) a preliminary description of the sugar outlook in the Province of Rio de Janeiro.

The factory, provided with the diffusion apparatus, intends to work 200 to 250 tons of cane per diem. There are three slicing machines with vertical discs, each working with six knives; but as in the course

of proof-working it was found that these machines (owing probably to old construction) were not able to cut the intended quantity of canes, two other new slicing machines will be put up for the crop. The diffusion battery consists of 12 vessels or diffuseurs, each with a separate small juice-heater or calorisateur. The whole arrangement is made and put up by an Austrian Engineering Firm, whose speciality is sugar machinery. The carbonic acid for the carbonatation or saturation of the temper lime is injected by a pump from the chief flue of the boilers and passes through a coke-furnace (Kindler Furnace) into the juice. This carbonatation is, as far as I know, the first in Brazil, and also the only one applied to the cane sugar manufacture. By using one ton of lime to 100 tons of canes at the clarification, a most beautiful, clear and limpid liquor is obtained with an extraordinary high coefficient of purity. The juice coming from the clarifiers passing through A. L. G. Dehne's (Halle) Filter presses (new construction) is then evaporated in an apparatus Wellner-Jelinek. The now well concentrated juice is still further purified by filtering it in closed charcoal filters over bone-black. The syrup is now boiled to massecuite, and this is then treated in the ordinary way as in Germany and Austria. The sugar made during this trial was of superior quality, and could compare without hesitation with the finest refined sugar of the world whether Paris or Austrian prime melis quality.

This new manufactory was erected with much ability by Dr. Lara, and the buildings planned and put up for the speciality of technical working. But unfortunately the ratio of the apparatus is not quite correct, the boilers and triple effects being much too large and the vacuum pans too small for the quantity of canes intended to be worked up.

This, with the absence of labour and want of canes, owing to its isolated position, is a fact much to be regretted in the interest of the cane sugar industry there, as complete success from the commencement of this factory would produce a general adoption of the diffusion process, which in the opinion of all competent technical men is the only rational mode of extraction, and far more suited to the sugar cane than to the sugar beet.

Thus, says Mr. Janot, the manager of the factory, when speaking of the extreme easiness and rapidity with which the cane diffuses or with which the exhaustion goes on, as one would naturally expect

when considering the cellular texture of this grass whose tissue is altogether opened by slicing.

So much to-day for the South-Brazilian efforts.

More complete and definite experiments, concerning which I received the following statement have just been brought to conclusion by the Dutch in Java.

The arrangements there are all carried out upon the most modern system (and it may be well to notice that diffusion of to-day and diffusion of about ten years ago, are perhaps in the same relation comparatively as the three-roller steam mill with its improvements and the old cattle-driven wooden two-roller mill). Here of course success is to be expected, especially with good technical management.

The German engineering firm (*vide*, note in the *Sugar Cane*, 1884, p. 384) who have furnished the entire plant, guarantee with their patent machinery the good working of the whole and *they engage for a full day's work of 250 tons*, or 25,000 tons for the campaign.

The cane-slicing machines—of which already one alone does the slicing of 250 tons a day, while the other is put up as a spare one—cut very good slices indeed, which exhausted, dry easily in the sun and give a very good fuel. They may be pressed off in a special machine by two conical discs (Construction Selwig and Lange, Brunswick, Kegelschnitzelpresse) and burnt like wet megass, or better dried in logies before burning.

The juice also in this factory is reported to be of extraordinary purity, much better than the juice from the old three-roller mill, is very limpid and works and boils much easier than the latter.

Concerning now the importance of the matter, I believe no objection will be taken to my publishing the Circular of the Committee for trying the Diffusion in Java, which I received from an interested party, as it possesses a remarkable importance in the history of cane sugar manufacture.

It runs in the original Dutch as follows:—

Het comité voor de proefneming met diffusie toegepast op suikerriet heft de eer aan Heeren deelnemers mede te deelen dat met de proefnemingen met de compleete diffusie installatie in de maand Juni je een begin gemaakt werd, en dat men daarmee thans zoorer gevorderd is, dat geregeld kan gewerkt werden.

De technischen bezwaren die zich hebben voorgedaan waren niet van overwegend belang, zoodat HET COMITE NIET AARZELT TE VERKLAREN, DAT HET DIFFUSIE PROCEDE, TOEGEPAST OP

SUIKERRIET, ZOOWEL MECHANISCH ALS CHEMISCH MAG GEACHT WORDEN VOLKOMEN GESLAAGD TE ZIJN.

Het comité meent zich voral's nog van het geven van cijfers en berekeningen to moeten onthouden, doch stelt zich voor na afloop der Campagne daarop uitvoerig terug te kommen.

Intusichen worden Heeren deelnemers in de gelegenheid gesteld om de working der compleete intallatie op de fabrik Djattiwangie, Cheribon, te komen bezichtigen, en wel op 21, 23, 31 Juli, 2, 11, 13 Augustus op welke dagen met de diffusie installatie zal worden gewerkt.

Djattiwangie, 3 Juli 1885. Namens het comité,

gez: G. M. ZUUR.

gez: S. EVERTS.

[*Translation:*

The committee appointed to experiment on diffusion as applied to the sugar cane has the honour to communicate to the gentlemen who are interested in the matter that in the month of June of this year was commenced diffusion arrangements which are now so far advanced that the work can be carried on with regularity.

The technical impediments or hindrances were of very slight importance, so that THE COMMITTEE DOES NOT HESITATE TO DECLARE THAT THE DIFFUSION PROCESS AS APPLIED TO THE SUGAR CANE MUST BE CONSIDERED AS A PERFECT SUCCESS WHETHER VIEWED IN A MECHANICAL OR CHEMICAL LIGHT.

The committee at the present moment deem it best not to give figures and calculations, as they purpose doing this in a complete and thorough manner at the termination of the Campaign.

In the meantime any gentlemen interested in the matter is at liberty to inspect the factory Djattiwangie, Cheribon, on 21st, 23rd, 31st July, and 2nd, 11th and 13th of August, when the diffusion process will be at full work.

Djattiwangie, 3 July, 1885. In name of the committee :

(Signed) G. M. ZUUR,

S. EVERTS.]

The foregoing *facts* require little to be added to them. The opportunity for advancing the future welfare of the West Indies is given. To be or not to be that is the question. For them—[though not for the cane sugar manufacturers generally]—may be granted five to ten years to meditate profoundly over this matter; but afterwards they must not complain and accuse again the wicked “beet-fabricants” with their bounty-fed—“beetose”—, or the still more wicked Continental Governments which so unjustly encouraged their subjects, or

these latter who decline for others' pleasure to stop in the way of progress. By the way it may be well for them to realize that at least this European bounty is only a premium granted to the intelligence of the European planter and fabricant against the abundant and fruitful resources of the genial soil of the tropics, and that the theory and practice of national economy are—sometimes—two different things. This, however, I know, may be a matter of opinion.

Finally I will add, that to think of instituting the diffusion process without thoroughly examining:—

1. The Water Question.
 2. The Clarifying and Filtering arrangements to be taken.
 3. The work to be done by the Boilers as well as the Steam and Water relations herefor.
 4. The Evaporation System to be accepted.
 5. The manner how rationally to work up the Masseccutes, and
 6. Last and entirely not least, the manner how to manage the whole in a chemical and—still more essentially—in a technical manner.
- means, on the one or the other side, partly further failure of the procédé, and doing more harm than good.

Therefore:—

Quidquid ages, prudenter peragas.

RESPICE FINEM!

COLOURING MATTER IN GRANULATED SUGAR.

From "Public Health of Minnesota," by Dr. HEWITT.

A sample of the "skimmings" of a syrup made from granulated sugar was sent to the laboratory for examination. The syrup was pale blue, and floating in it threads of what looked like albuminous matter of a darker blue. Nearly all the colour separated from the syrup in this way. This coloured matter was tested as follows:—Its colour was destroyed by hydrochloric lime, nor would it dissolve in hot alcohol. Hence it was inferred to be neither indigo, aniline blue, sulphindigotic acid, nor prussian blue. The colouring matter responded to all the tests of ultramarine. The practical evil of this colour in sugar, used in this way, is that the acid fermentation sets free sulphuretted hydrogen, destroying the value of the article as food. In the small quantity used as "blueing" in sugar, ultramarine is probably harmless, except as above.

REPLIES OF THE BRITISH SUGAR REFINERS'
COMMITTEE TO THE QUESTIONS OF THE ROYAL
COMMISSION ON THE DEPRESSION OF TRADE.

1. "In what branches of trade or industry is your Association specially interested?"

Sugar refining.

2. "In what proportion do they find their market at home and in foreign countries; and, as regards the latter, in which countries chiefly?"

Almost entirely at home. There is a small export, chiefly to the Mediterranean and the North of Europe, but this consists of the lower products of the manufacture. As to refined sugar properly so called, the bounties on the exportation of foreign refined sugar practically close the world's markets to the British refiner.

3. "How have they been affected in the last five years as compared with the periods 1865-70, 1870-75, 1875-80, in respect to—

- (a) Volume;
- (b) Gross value;
- (c) Net profit;
- (d) Amount of capital invested;
- (e) Quantity of labour employed?"

(a) Increased.

(b) Decreased.

(c) Decreased.

(d) Increased.

(e) Decreased per ton of sugar.

4. "The phrase 'depression of trade' would appear to imply a 'normal level' of trade. During what periods in the last twenty years should you say that trade had been—

- (a) At its normal level;
- (b) Above that level; or
- (c) Below it?"

Defining "normal level of trade" to mean, so far as our industry is concerned, a condition of things when all the manufactories could be kept working at a moderate profit, the whole of the last ten years may be said to have been below the level, and gradually getting more

so. The previous ten years, disastrous for the loaf sugar makers, except the year when Paris was besieged, may be considered normal years for the other classes of refined sugar.

5. "Judged by a scale constructed in this manner, can the condition of the branches of trade or industry in which you are specially interested be fairly described at the present time as 'depressed?'"

Yes.

6. "If so, when did the depression begin; when did it reach its lowest point; and what are its most prominent symptoms?"

In the loaf sugar industry it began about 1864, and reached its lowest point in 1875. That industry is now again suffering very much from the effect of foreign export bounties. In the other branches of the sugar-refining industry the depression began about 1875, and is now worse than ever. The prominent symptoms are an insufficient margin of price between raw and refined sugar, and that consequently from time to time works are shut up.

7. "Has its progress hitherto been uniform or irregular; and what do you anticipate that its course will be in the immediate future?"

Its progress has varied exactly as the bounties given on the exportation of foreign refined sugar have varied in amount and extent, and its future will depend entirely on the action taken by foreign Governments with regard to them.

8. "Are there any special circumstances to which the existing condition of the special trade or industry of your Association can be attributed?"

Yes; the depression of our industry is to be attributed entirely to foreign export bounties.

9. "Should you say that the demand for, the supply of, or the return on capital in your trade or industry is above or below the average of the last twenty years?"

Below.

10. "Is the rate of wages in relation to service rendered and to the quantity and quality of work produced (a) for skilled and (b) for unskilled labour, in your trade or industry, above or below the average of the last twenty years?"

Above.

11. "What measures could, in your opinion, be adopted to improve

the existing condition of your trade or industry (a) by legislation, and (b) independently of legislation?"

What we require is that the artificial help our foreign competitors get from export bounties should be withdrawn. This could be done either by removing the bounty by a countervailing duty, or by negotiating with foreign countries for the abolition of bounties. We do not desire the imposition of a countervailing duty, but we do desire very strongly the admission of the principle, as absolutely necessary for the success of the negotiations. That a duty to countervail a bounty is consistent with, and in fact conceived in the interests of Free Trade, and that it is in no way allied with doctrines of reciprocity and retaliation, has already been demonstrated in evidence before the Select Committee on Sugar Industries and in the public press, and we ask leave to give evidence before your Commission to the same effect. The perfect cure for our grievance would be the abolition of sugar duties all over the world.

12. Answered under Question 8.

MR. CHAMBERLAIN ON THE SUGAR QUESTION.

The following letter, in reply to Mr. Chamberlain's recent remarks on the sugar question, appeared in the *Daily News* of the 24th ult:—

FREE TRADE AND THE SUGAR QUESTION.

TO THE EDITOR OF THE "DAILY NEWS."

Sir,—So many inaccurate and unsound statements are made from time to time about the sugar bounties, their causes, effects, and remedies, that it appears the more important that Liberal exponents of the case should be sound and accurate as to their theories and facts. To the trade who are sorely harassed by these export bounties it is at times most disappointing to see how little the facts and arguments are really grasped by Liberal politicians, who should, one would think, be more careful than the common herd to be sure of their facts and clear in their arguments. Mr. Chamberlain has very properly been exposing the fallacies of the reciprocity and retaliation theory which now goes by the name of Fair Trade. But I find that

in one of his recent speeches * he has most unfortunately mixed up this subject with the sugar question, and gone even so far as to say that "he would as soon fight this Fair Trade humbug upon sugar as upon any other thing." No doubt Mr. Chamberlain has his hands pretty full just now, and may not have had time and opportunity to consider the sugar question from a Free Trade point of view. Nevertheless, it is most important to the trade which has had to bear the brunt of this export bounty competition, and which is at the present moment suffering most severely from it—I speak of the whole sugar-refining industry of this country—that no accidentally erroneous view of their case should receive the publicity of Mr. Chamberlain's powerful advocacy and of your columns without some effort being made, through your kind permission, to set the minds of Liberal politicians right with regard to it. The sugar question has nothing to do with the so-called Fair Trade question, because it has nothing to do with reciprocity or retaliation, and for this simple reason, that if the bounties were removed to-morrow by a countervailing duty the only effect would be that things would be restored to their natural state as it existed before bounties were given, producers would be released from the hindrance caused by the bounties, and buyers would be free to buy at the natural cost price. There is no retaliation in such a course as that, nor any reciprocity asked for. Free Trade is restored, not broken.

So much for principles. Now, as to facts, I regret again to find that Mr. Chamberlain has been misled. He said on the 10th inst. :—

1. That most of the foreign bounties on the export of sugar are given on raw sugar from Germany, the United States, and France.
2. That this is a benefit to British sugar refiners.
3. That if the bounties were stopped, half the sugar refineries in the kingdom would be closed.
4. That the makers of "crystals" do not suffer from the bounties.
5. That cheap sugar is the foundation of the jam and confectionery trades, and that, therefore, if the bounties were got rid of, a heavy blow would be struck at these trades.

To correct these erroneous statements, for which, of course, Mr.

* November 12, at Birmingham.

Chamberlain is not responsible, I ask leave to state the facts in reply to them.

1. There is a bounty on raw sugar from Germany, but there is a bounty on refined sugar from the United States, Holland, Germany, Russia, Austria, and France. There is no bounty on raw sugar from the United States. France hopes to have one soon. The result of the bounties on refined is that our imports of foreign refined have increased as follows:—

First ten months of—

1883.	1884.	1885.
Tons.	Tons.	Tons.
132,654	178,918	212,978

2. The bounty on raw sugar is no benefit to British sugar refiners, since it does not enable them to buy raw sugar cheaper than the rest of the world.

3. If the bounty on raw sugar were stopped the margin of profit (or loss) between raw and refined sugar would not be affected, and, therefore, British refineries would remain as they are. If all bounties were stopped the work of British refineries would increase.

4. The makers of "crystals" are being severely injured by the bounties.

5. The jam and confectionary trades of course like to buy refined sugar as cheap as they can; but as a penny a hundredweight (*i.e.*, the twenty-eighth part of a farthing a pound) below cost price is sufficient to enable the foreign refiner to undersell his competitors, it cannot be said that the jam makers reap much benefit from the bounty; certainly their business does not depend on the maintenance of the bounty, nor can the loss of that small fraction of one farthing a pound be called a very heavy blow.

I venture to hope that in fairness to an important British industry which is now suffering severely from the effects of foreign export bounties you will grant the valuable publicity of your columns to these corrections of words which, though uttered inadvertently, must if they remain uncorrected greatly injure our cause.

I am, Sir, your obedient servant,

GEORGE MARTINEAU, Secretary,
British Sugar Refiners' Committee.

City Liberal Club, Nov. 20.

THE BOUNTY ON THE EXPORTATION OF REFINED SUGAR FROM RUSSIA.

The following letter has been addressed by the British Sugar Refiners' Committee to Lord Salisbury:—

21, Mincing Lane, 25th November, 1885.

THE MOST HON. THE MARQUIS OF SALISBURY, K.G.,
Secretary of State for Foreign Affairs.

My Lord Marquis,—With reference to my letters of the 11th and 13th of August respecting a new bounty on the exportation of white refined sugar from Russia, which were confirmed by a despatch from Sir Edward Thornton of the 8th August, enclosing translation of a decree ordering the payment of a bounty of one rouble per poud (6s. 3d. per cwt.) on two million poud (32,200 tons) of white refined sugar, I am desired by my Committee to direct your Lordship's attention to the following extract from the Paris *Bulletin des Halles* of the 24th inst. :—

“Aujourd'hui le chiffre d'exportation de 32,760 tonnes a été atteint, et même quelques lots, dépassant la quantité autorisée, étaient restés en souffrance. Le Gouvernement vient d'en permettre l'exportation. On dit même que le Gouvernement russe aurait garanti le drawback de un rouble par poud jusqu'au chiffre de 50,000 tonnes sucre sable. Aucune nouvelle officielle n'est encore parvenue, mais il est probable que cette nouvelle facilité sera donnée à l'exportation.”

I am desired to ask whether your Lordship can kindly furnish our Committee with reliable information on this point.

The sugar refiners of this country are at the present time terribly harassed by the large increase in the importation of foreign refined sugar, which is being sold in our markets below cost price by means of the export bounties, and this additional quantity from Russia, receiving such an enormous bounty as 6s. per hundredweight, is consequently regarded by them with grave apprehension.

I am, my Lord Marquis, your obedient servant,

GEORGE MARTINEAU, Secretary,
British Sugar Refiners' Committee.

SOME INTERESTING PARTICULARS RESPECTING THE HAWAIIAN ISLANDS.

SUGAR CROP EXPECTED TO REACH NEARLY 90,000 TONS.

A correspondent of a New York contemporary, writing from Honolulu on the 12th October, contributes some interesting trade and business items from that district. Concerning the sugar crop, he remarks that as the weather had been very favourable for planters, the cane promised to be exceptionally large. By late reliable reports from the sugar-growing districts, it was believed that next season's crushing will yield nearer 90,000 tons sugar than 80,000 tons, which was the early estimate. The former figure was more likely to be correct, because many of the mills had adopted the maceration process, the saving effected by it being not far short of 10 per cent. The sugar export for the September quarter, 1885, was 27,770,901 pounds (12,353 tons), worth \$1,379,804; for the nine months ended September 30, 149,644,276 pounds (66,805 tons), against 124,549,452 pounds (55,602 tons) in the corresponding months of 1884. This was an increase of 25,094,824 pounds (11,203 tons). There was still a considerable quantity of this season's crushing to go forward, and the last of it will hardly be shipped when the new crop begins to come in.

Rice export fell off 1,777,847 pounds in the first nine months of 1885, as compared with the same months of 1884.

Banana cultivation had been greatly stimulated in the neighbourhood of Honolulu, where water is available, and a considerable area of swamp land has been drained by Chinese and planted in bananas. The total shipment of bananas to San Francisco up to September 30, 1885, was 43,673 bunches, being an increase of 4,874 bunches over the corresponding period of 1884. Averaging each bunch of bananas at \$1, the export value for the year will be about \$50,000. This is a comparatively new industry, and all races engage in it.

Coffee of a very superior quality was raised in Kona district, island of Hawaii, but the export was trifling.

Hides and skins of sheep and goats formed the next considerable head of export. In the first nine months of the year the export was 15,336 hides, 5,563 sheepskins, and 16,445 goatskins.

The wool export so far this year amounts to 312,616 pounds.

Official returns of imports and exports showed that the imports of foreign merchandise fell off \$735,468 on the first half of 1885 compared with the same months last year. This was very nearly one third, the figures being—1884, \$2,457,328; 1885, \$1,721,859. There was a large increase in domestic exports, however. The figures for nine months were—1885, \$7,665,116; 1884, \$7,027,112; increase, \$638,004. Stocks of merchandise had run low, and there should, it was felt, soon be a revival in business.

As a consequence of slack imports customs duties had fallen off, and by reason of diminished stocks the revenue from personal-property tax will be considerably diminished next year. This (writes the correspondent) is somewhat unfortunate, as a property tax of $\frac{3}{4}$ of 1 per cent. and the customs duties, plus license fees and port and harbour charges, are the sole dependence of the Hawaiian Government. The operation of the reciprocity treaty of course tends to reduce the customs revenue, but this is compensated for by increased trade. The kingdom, besides having such exceedingly light taxation, is practically out of debt. It is introducing contract labour from Japan and Portugal, or the Azores, but Chinese immigration is discouraged as much as possible. Notwithstanding almost general prohibition they continue coming in, and so great is their hold upon the industries of the country that they may be said to control nearly every trade except that of iron, and they are making inroads upon the lighter branches of that trade also. They are regarded by the sugar planters as their most reliable labour, although public policy is against their coming without wives and children.

HAWAIIAN SUGAR PLANTERS AND THE AMERICAN REFINERY.

From San Francisco Merchant.

The news of the arrangement for the sale of a portion of the Hawaiian sugar crop to the American Refinery was received in Honolulu with very considerable exultation on the part of those who have systematically opposed and maligned Colonel Spreckels. The *Gazette*, which is the opposition planters' organ, is exceedingly jubilant, and declares that the islands are emancipated from the tyranny of monopoly, while the same issue contained an editorial explaining

that the planters' deputation had done everything they possibly could to induce Colonel Spreckels to buy even half their sugar, at the same time expressing regret that he had been so blind to his own interests as not to renew his contract for the Island crop. This flat contradiction appears somewhat ridiculous.

Mr. P. C. Jones, one of the deputation who visited San Francisco, stated in an interview published in the *Bulletin*, that they were not compelled to buy shares in the American Sugar Refinery, but that they would share in its profits. The *Advertiser* inquired the character of the arrangement between the planters' agent and the American Refinery by which the latter guaranteed a share of its profits to outsiders who held no stock, but no reply was made. By degrees it leaked out, however, that the planters had the option, for a stated time, of taking one-fourth of the stock at par, with a guarantee of 30 per cent. of the profits. It is easy promising the latter, but if the business should only pay "Irish dividends"—that is, should lose money and be run by assessments—how will the planters like it? Unless they subscribe to the capital for the American Refinery they cannot sell their sugar, and unless they can refine their sugar at a profit and command a market the planters will lose money. The agents, however, will be secured to a great extent by their commissions.

The statement has been made and published in San Francisco that part payment for the Island sugar would be by stock and an interest in the American Refinery. The denial of this fact by Mr. Jones looks somewhat peculiar. The agents for the Hawaiian planters, having made the best possible arrangements they could for the sale of their produce, should have no reason to be ashamed of acknowledging these terms and conditions. Further than this it is important for the business men of San Francisco who trade with the Islands, to know exactly the commercial standing of the men with whom they conduct their business transactions. There should be no show of hesitancy in this respect. We regret that the planters are so far removed from the base of operations of the organisation in this city with which they are now so closely related, and it would be well for them to announce by whom their interests are cared for in San Francisco. This appears to us to be the objective point of the syndicate which is now manipulating this sugar deal.

ON CENTRAL SUGAR FACTORIES FOR QUEENSLAND.

The following interesting and practical remarks, on this subject, by Mr. James Mc.Henley, is reprinted from a recent number of *The Queenslander* :—

In order to solve the labour question, and try if white labour can cultivate the cane and manufacture sugar profitably, the farmers of Queensland are asking the Government for help in the erection of central mills for crushing their cane. This, then, is a step towards progress; but whether it will work under Government supervision profitably to the farmers is a debatable question, when it has in so many instances failed when worked by private enterprise. It is foolish in the planters and others in the sugar industry to expect prices to rise again to the same height as formerly, as the circumstances in which the industry is placed now are so far different than previously. The London market rules the commerce of the world, and the various sources of supply will ever keep the prices of sugar at too low a figure for the colonial planters to thrive at unless he follows up the footsteps of his rival the beet-sugar industry. For the last six years I called the attention of planters to these facts, and pointed out to them the necessity of better machinery and technical skill of a superior kind, or the competition of the beet sugar would involve in universal bankruptcy the cane sugar industry. These facts they for the greater part ignored, and still persist in pursuing their work in the most crude, wasteful, and empirical manner that could possibly be imagined, refusing to believe in the evidence of the senses, or accept the self-evident truth. I cannot point out from Mackay to Cairns one single mill from which they send to market one-half of the sugar known to exist in the cane. The usual mode of working is to leave one-third of the sugar in the megass, one-third in the molasses, the remaining third called the output for the sum total; while the lands were cultivated with a similar empiricism to that of the factory. Now, cane is a very exhausting crop; yet I have known canes to be ratooned in Malacca for fourteen years, and yield more sugar to the acre than that in general from plant-cane in Queensland, and this effected by returning to the soil the bi-products of the mill. Now, Providence is kind to those who act in accordance with the natural laws; and if the planters would but return the skimmings from off the clarifiers and the ashes of

the megass to the soil, they would be giving back to the land that which was taken from it, and thus maintain the fertility of the field for years and ages to come. But instead of doing so they apply guano, bone dust, superphosphate of lime, and other manures, allowing at the same time the bi-products of the mill to run to waste, the greatest and best of fertilisers. In the manipulation of the cane juice, one understanding the chemistry of sugar manufacture would be inclined to think from the system followed that the making of molasses was the aim of the sugar boiler, and from the way in which cane juice is treated in all the mills that I have visited in the process of defecation that molasses was aimed at as the principal and sugar as the secondary product. The instruments which science has furnished for the guidance of the sugar manufacturer are everywhere absent and their uses unknown, the only one found being that known as Baumé's saccharometer, which is a hydrometer and not a saccharometer; the only instrument for that purpose is the polariscope, by the aid of which the quantity of crystallisable sugar in the cane juice can be estimated with the utmost accuracy, and should the sugar when brought to the scales not tally with that demonstrated by the polariscope the loss sustained in the course of manufacture can be known. A piece of blue litmus paper is dipped in the cane juice, and, should the acid inherent therein turn it red, a lot of lime is thrown in at random until a neutral tint is shown; but, if the science of acidimetry and alkalimetry was known, he would have first of all estimated the exact quantity of acid in a given quantity of juice and the neutralising power of the lime, and applied the exact quantity of lime required and no more, and by testing a sample by the polariscope the amount of crystallisable and uncrystallisable sugar, if any, would be known at once and a knowledge gained of the correctness or otherwise of the operation. Molasses is not a product of the cane, but is generated in the course of manufacture, and as a substance is composed of crystallisable sugar, glucose, and water; and, if the chemistry of sugar manufacture was understood, not more than 10 per cent. would be tolerated instead of, as in most instances, being cent per cent with the sugar made. The time required for an assay acidimetric would take about three minutes, and a like time would be consumed in an assay alkalimetric; the cost for chemicals would be about threepence for every ton of sugar made; and by these means 50 per cent., or thereabouts, would be added to the crystalline

sugar, and there would be a commensurate decrease in the molasses tank. But to do this work implies a knowledge of chemistry, which planters ignore, preferring the services of unskilled men and losing more by such in every day's work than would pay the wages of every man employed on the plantation from the manager to the cook. But I need not continue this subject any further, as the empiricism everywhere is so patent to the eye of the technologist as to require no further elucidation. In India, where double crushing and maceration is followed, ten tons of cane in general give a ton of refined sugar. In the Aska factory, at Ganjam, where the diffusion process is followed, nine tons of cane in general give a ton of sugar, as the diffusion process extracts more juice from the cane than the other; as high as 83½ per cent. has been taken from plant cane. In Queensland from 20 to 30 tons of cane are taken to make a ton of raw sugar, and from my own experiments I find from 15 to 20 per cent. of sugar crystallisable in the cane juice, comparing favourably with that of India. On the Herbert as high as 80 tons of cane has been taken from an acre, of good sugar-producing quality. What then is there to prevent 10 per cent. of sugar to the weight of the cane? Nothing that I know of if correct principles were understood and acted upon.

Some thirty years ago when cane was crushed by windmills and cattle mills, and in some places with iron rolls from 15in. to 18in. in diameter, the small quantity of organic matter then expressed permitted the sugar boiler making a large-grained sugar of good sweetening power, and as much sugar then as now from an acre. But why this anomaly? The ponderous machinery now expresses from the cane great quantities of organic matter, contaminating the juice, making the sugar inferior in sweetening power, and generating great quantities of glucose, lessening the quantity of crystalline sugar; and, though machinery has been improved, sugar boilers have not improved in the least; and until chemists trained to the work are employed in the mill the same state of things will continue to prevail. When skilled men are employed, two tons of sugar will be taken from the cane for one that is taken now, and the cane sugar industry will become more profitable than previously, in spite of the beet competition. Some five million pounds sterling has been invested in the cane sugar industry, and had a correct system been followed the increase of sugar resulting therefrom would by this time have recouped the proprietors of sugar estates for their outlay. I speak

on these matters with the authority of a scientist which cannot be controverted or admit of doubt or cavil. If the farmers get central mills superintended by Government agents and worked under the existing system, instead of being a boon it might turn out to be a white elephant, involving them in difficulties resulting in ruin. It is of no use saying that "in the multitude of counsel there is wisdom;" a thousand non-technical men know no more than one, and will only hasten the ruin. If, on the other hand, skilled men supplant the unskilled at present employed, there is nothing to prevent their succeeding.

JAMES M'HENLEY, Analytical Chemist.

Ingham, 12th September.

SORGHUM SUGAR, OTTAWA, U.S.A.

The Franklin Sugar Company, of Ottawa, Kan., will make this season about 500,000 pounds of sorghum sugar, and 80,000 gallons of sorghum syrup. Samples of the sugar have been shown here. They are light yellow in colour; some very desirable, others having a dull look. It is claimed that these sugars will test 2 to 5 degs. higher than cane sugar of like colour. The company sells its products to nearby points, obtaining 6½c. for the sugar and 30c. per gallon for the syrup. We believe this factory is the only one in the West operated this season for the manufacture of sugar from Northern sugar cane. Its owners feel greatly encouraged, and manifest the greatest confidence that there is a great future for the sorghum sugar industry. We certainly have confidence enough in the genius of the American people to believe they will find a cure for all the difficulties that hinder its progress, and within a short time.

Last year about one million pounds of sugar were made from sorghum, but this year the quantity will probably be less. The works, formerly at Hutchinson, Kansas, and which made 250,000 pounds in 1884, have been consolidated with the factory at Ottawa, where the Government is carrying on important experiments, chiefly with the object of testing the diffusion process for obtaining sugar from sorghum, it being the same process that is used in Europe for the securing of beet sugar. The Government has erected a diffusion battery of ten cells, with all appurtenances, capable of working about 100 tons of cane per day. Prof. Wiley, with a corps of assistants, is supervising the experiments.—*American Grocer.*

HARVESTING SUGAR CANE.

GATHERING CANE BY THE TON.

(Continued from page 608.)

First-class double mills, well handled, obtain about 70 per cent. of juice from the cane; first-class single mills 60 per cent. Estimating cane juice to weigh $8\frac{3}{4}$ lbs. per gallon, which is about its true weight, 70 per cent. extraction gives 1,400 lbs. of juice from a ton of cane or 160 gallons, and 60 per cent. extraction gives 1,200 lbs. or 137 gallons.

To take then, for example, a sugar house consuming 200 tons of cane per day, and having a double mill, and presumably extracting 70 per cent., let us say the morning watch makes 8,800 gallons of juice, we find this represents the consumption of 55 tons of cane, and if it be put on the carrier by four men at five cents per ton, they will have made \$2.75 for their half day's work, or 69 cents each, equal to \$1.38 per day, and this I have often seen done.

From the data now given, the compensation may be determined in whatever way is satisfactory to the men. If the juice from the mill runs directly into clarifiers of 600 gallons each, each clarifier would represent $3\frac{3}{4}$ tons of cane for a double mill, and $4\frac{3}{4}$ tons for a single mill, and on the basis herein named, five cents. per ton during the day and ten cents. per ton during the night, $18\frac{3}{4}$ and $37\frac{1}{2}$ cents. per clarifier would be the prices where the double mill is used, and 22 and 44 cents. per clarifier where the single mill is used. In my own case, the juice for each watch was computed in gallons, and I paid 30 cents. per 1,000 for the day work, and 60 cents. per 1,000 for the night work, and as $6\frac{1}{4}$ tons of cane are required to make 1,000 gallons at 70 per cent. extraction, this would be a shade under five and ten cents. per ton.

By promptly posting on a black-board within the mill-room the work done on each watch, the men know at once how much they have earned.

The day watches had better be a constant gang, and the extra men for the night service may be hired by the contractors, or hired at their cost. The extra men needed for the night service cannot well be merged into the contract, although there is no serious difficulty about

it. A correct record kept of the work done permits a settlement to be made with the night men for just the work done by them; but as they do not share in the day work, such men cannot be depended on for the night work, and hence the extra night men are a varying gang, but are forced to do good work to keep pace with the regular gang which gets paid proportionately to the work done.

I believe the contract system can also be applied to the cutting and to the loading of cane. An able-bodied man can load ten tons of cane per day into carts. I have had them average eleven tons per day for several days, but unless they are loading by the ton they will almost surely fall under ten tons, and a medium gang will not load over eight tons per man. The men can be worked in gangs of four or five each, and the carts of each gang be kept separate at the scale-house, or the whole mixed together, with a slight allowance to the foreman who organizes the gang.

A delivery of 200 tons per day, an average distance of say three-quarters of a mile, should require 14 carts, each making 12 trips and carrying 2,500lbs. of cane at each load. These would probably work in strings or squads, two of five carts and one of four, and say loaders divided into gangs of 6—6 and 5. The numbers of these carts being given and the names of the loaders attached to each squad or string, the work done can be exactly determined every night, and greatly to the satisfaction of the labourers, though a weekly determination is usually satisfactory.

I have never yet cut any cane by the ton, but I believe it can readily be done, and on the following basis: By the standard adopted by our Association, an acre of cane means an acre of land actually under cultivation with the plough, and omits all roads, ditches, &c. If the cane be planted in rows seven feet apart, thirty of such rows one acre or 210 feet long would make one acre of cane, or say 6,300 feet of rows.

Those who have been weighing cane for several years have learned to judge with wonderful precision the weight of the cane per acre on any piece of land under consideration. Let us take, for example, a piece of cane that we judge will yield 25 tons per acre. Let us measure the length of the rows and say they be found 850 feet long, then each row would be 850, 6,300 of an acre, or say $13\frac{1}{2}$ per cent., and $13\frac{1}{2}$ per cent. of 25 tons would be $3\frac{3}{4}$ tons per row.

In long straight canes a good cutter can cut six tons per day. They

rarely cut over five tons per day, and an average gang on average cane will not average over four tons per day. We may then fairly estimate cane cutting at costing 25c. per ton, and on this basis the rows above would be worth 84c. per row, or say 85c. per row for cutting. Let 85c. per row be offered for this work and some of the best hands would cut two rows per day. The cutter would perhaps slight his work, but there is no remedy for this except vigilance on the part of the overseer, and that is equally necessary under our present wages system.

I have thus endeavoured to shadow out how the contract or piece-work system can be applied to our cane harvest, and the results given are from my own experience.

The figures I give are based upon good average conditions—crooked canes or frozen canes would modify the results. Special difficulties may present themselves to various parties who would desire to undertake the contract system, but they will find that with tact, good nature, and perseverance they can generally overcome all the difficulties, and the results will be larger earnings for the labourers, and cheapen the production for the planter.

THE LATE MR. BENJAMIN WHITWORTH, SENR.

The following letter has been addressed by the London Sugar Refiners to Messrs. Curteis, Whitworth, & Neame, Eastcheap, E.C.:—

9, Mincing Lane, November 12, 1885.

Dear Sirs,—We desire to express our very sincere sympathy with your firm and the family at the death of Mr. Benjamin Whitworth, Senr., and to assure you of the great respect in which he was held by the Sugar Refiners of London, during the long period of his business career.

We are, dear Sirs,

Yours very faithfully,

JAMES DUNCAN.

DAVID MARTINEAU & SONS.

ABRAM LYLE & SONS.

JOHN SCHWARTZ.

HENRY TATE & SONS.

L. COWAN & SONS.

C. WOHLGEMUTH.

T. B. DAKIN.

To Messrs. Curteis, Whitworth, & Neame,
Eastcheap, E.C.

FRUIT AND VEGETABLE COMPETITION.

ENGLAND CAN HOLD HER OWN.

Mr. Juson, a large farmer in Buckinghamshire, speaking of the French competition, said for the last twenty years he had been competing with Frenchmen in trying to send as good vegetables to Covent Garden Market, and he had also, even this year, been sending a ton of fruit there to compete with foreigners; and his experience had been—and he had had some experience of the market, having been there two or three times a week, and knowing some of the ins and outs of it, and of the French fruit and vegetables—that he never saw they could beat us, only on one point, and that was with regard to pears. He believed the French could beat Englishmen in pears, because they could grow them larger and a little better flavoured, and could send them within the time that we could keep ours. He was an Englishman, and was not ashamed of his country, and he did not think they could be beaten yet awhile by the foreigners. As farmers, gardeners, fruit growers, dairymen, and poultrymen, if they tried they would never let them beat them. He had been connected with one of the most respectable salesmen in Covent Garden Market, and had always heard that the English produce made more than the French.

MONTHLY LIST OF PATENTS.

Communicated by Mr. W. P. THOMPSON, C.E., M.S.C.I.,
Fel.Inst. P.A., Patent Agent, 6, Lord Street, Liverpool; and
323, High Holborn, London, W.C.

ENGLISH.

APPLICATIONS.

12869. D. STEWART, Glasgow. *Improvements in feeding apparatus for sugar cane mills.* 27th October, 1885.

12871. W. R. LAKE, London. (In trust for Franz O. Matthiessen, United States.) *Improvements in and relating to bone-black filters.*

12874. W. R. LAKE, London. (In trust for Franz O. Matthiessen, United States.) *An improved process of and apparatus for the purification and decolorization of sugar.*

12875. W. R. LAKE, London. (In trust for Franz O. Matthiessen, United

States.) *Improvements in apparatus for the decolorization of saccharine or other liquor.*

12876. W. R. LAKE, London. (In trust for Franz O. Matthiessen, United States.) *Improvements in apparatus for the filtration of sugar liquor.*

12877. W. R. LAKE, London. (In trust for Franz O. Matthiessen, United States.) *Improvements in and relating to bone-black filters for filtering sugar liquor.*

12878. W. R. LAKE, London. (In trust for Franz O. Matthiessen, United States.) *Improvements in apparatus for effecting the decolorization of sugar liquor.*

12879. W. R. LAKE, London. (In trust for Edward E. Quimby.) *Improvements in and relating to apparatus for effecting the decolorization of sugar liquor.*

13792. A. C. EWING, Glasgow. (In trust for T. Shields, British Guiana.) *A combined eliminator and filter for treating sugar cane juice and other liquids.*
12th November, 1885.

ABRIDGMENTS.

327067. WILLIAM CHRYSTLER, La Grange, Indiana. *Molasses-cooler.* September 29th, 1885. This invention relates to improved apparatus for atmospherically cooling the syrup or molasses, resulting from the ordinary evaporating process in the manufacture of sugar. Its prime object is the provision of means by which this operation may be conducted in a manner that the degree of colour or flavour of the syrup may be thoroughly regulated by the attendant or operator in charge. The apparatus consists of an adjustably-inclined pan or trough, preferably of copper, and enclosed in a wooden casing having sides rabbeted or grooved on their upper edges. The pan is divided into channels by partitions of gradually increasing length, and has a suitable outlet. A tank for holding the molasses is placed at the upper end of the trough, and is adjustable in the grooves of the casings sides and is provided with faucets opening into the channels. A screen corresponding to the contour of the pan fits over its top and prevents the settlement of dust or dirt.

329324. S. M. LILLIE, Philadelphia, Penn. *Bone-black drier.* October 27th, 1885. The process consists first, in drawing or forcing the products of combustion of the kiln through the wet black, contained in suitable receptacles, the products of combustion being first cooled to a degree by mixing them with cooler air or gases, so that the danger of igniting the black may be lessened; second, in drawing warm air from around the kiln through moist black, contained in other suitable receptacles, by which the black is more or less dried, and the air cooled and laden with moisture, and in using the air thus cooled and moistened for mixing with and cooling the products of com-

bustion, as above set forth; and, third, it consists in collecting the steam generated in the drier and retorts of the kiln, and in using the same for heating water or for heating or evaporating sugar solutions. The apparatus consists of a drier located above the kiln, and of exhausting apparatus connected with the drier and with the retorts of the kiln for drawing air and products of combustion through the wet black in the drier, and for exhausting the steam formed in the retorts from the same. It also comprises suitable condensers for utilizing the vapours and steam drawn from the black in heating water or in heating or evaporating sugar solutions.

329184. FRANZ O. MATTHIESSEN, Irvington, New York. *Continuous filter for filtering sugar liquor.* October 27th, 1885. This apparatus for filtering sugar liquor through bone black is designed to work in what the French call the "methodical" manner. It consists in the use of a vertical cylinder, into the top of which the bone-black is fed, and down which it falls by its own gravity into a receiving chamber; from whence it is elevated by means of an upright elevator cylinder provided with an elevator screw, the axis of which is coincident with the axis of the said cylinder, for elevating bone-black through said cylinder, and is discharged at or near the top of the elevator tube; combined with these parts is a service-pipe for introducing the sugar liquor into the upper part of the elevator cylinder, and a discharge outlet or outlets for the discharge of the sugar liquor from the apparatus, the arrangement being such that the mass of bone-black is moved through the filtering apparatus in one direction, while the sugar liquor is moved through it or through a suitable part of it in the opposite direction.

329185. FRANZ O. MATTHIESSEN, Irvington, New York. *Bone-black filter for filtering sugar liquors.* October 27th, 1885. In bone-black filters for filtering sugar liquor by the process of upward filtration the lowest stratum of bone-black is that which soonest becomes exhausted, and it is the object of the improvement to provide for the gradual and uniform removal of the lowest stratum of bone-black without causing any violent falling movement of the superincumbent mass of bone-black, so that concurrently with the removal of the exhausted bone-black fresh bone-black can be introduced into the top of the filter, where the filtered sugar liquor is discharged; and the invention consists in supporting a mass of bone-black in a filter-chamber upon the uppermost convolution of a screw rotating upon a vertical axis, or upon the upper surface of a suitably perforated or slotted rotating disk provided with a shearing blade or blades. By the rotation of the said screw or the said disk the exhausted bone-black is gradually removed or cut off from the lower end of the mass of superincumbent bone-black, and is allowed to fall into a receiving chamber, from which it is removed by any convenient means, as, for example, a screw conveyor or conveyors.

329329. F. O. MATTHIESSEN, Irvington, New York. *Bone-black Filter.*

October 27th, 1885. This invention is for an improvement on those mentioned immediately above, and consists in a filtering chamber, provided at the top with a rotating compressor or screw, having openings between its blades for feeding fresh bone-black into the filtering chamber, means for rotating the said compressor, and thereby pressing downward and compacting the mass of bone-black contained in the filtering chamber, in combination with means for supporting the bottom of the said mass of bone-black, and for gradually removing the exhausted bone-black therefrom, whereby the bone-black in the filtering chamber may be maintained in a compacted condition by feeding into and compressing at the top of the filtering chamber a quantity of fresh bone-black corresponding to the quantity of exhausted bone-black removed from the bottom of the filtering chamber. The means for supporting the bottom and removing the bone-black consists of a scraper, rotated at intervals over a transverse perforating stripping plate or "discharger," by this means the exhausted bone-black is gradually sheared or scraped from the bottom of the mass of bone-black contained in the filtering chamber.

329330. F. O. MATTHIESSEN, Irvington, New York; and E. E. QUIMBY. Orange, N. J. *Apparatus for decolorizing saccharine and other liquids by filtration through bone-black.* October 27th, 1885. This relates to the machinery already described in the last three mentioned patents, and consists in the arrangement at the level at which the sugar liquor is to be discharged, of transverse troughs, protected above by inverted V-shaped shields, and, if need be, by sieves interposed between the wings of the shields, whereby the bone-black is prevented from making its way into the draining troughs. The draining troughs are connected with the apertures in the side walls of the filtering chamber, through which the sugar-liquor is discharged by means of horizontal tubes of suitable length, in order that such portion of the sugar-liquor as makes its way upward along the interior surface of the wall of the filter may not have immediate access to the draining troughs, but be compelled to move laterally a short distance in order to reach a point at which it can make its way into the draining troughs, the reason for this being that the sugar-liquor rises more freely along the wall of the filter than it does through the central portion of the mass of bone-black.

329331. FRANZ O. MATTHIESSEN, Irvington, N. Y. *Process of removing the impurities of raw sugar.* October 27th, 1885. This invention is for the process already described applied to raw sugar—namely, dissolving the raw sugar in water, then filtering it by forcing it upward through bone-black, and by means of a scraper or discharger, gradually removing the collected impurities and exhausted bone-black from the bottom of the mass of bone-black contained in the filtering chamber through which the sugar liquor is forced

329332. FRANZ O. MATTHIESSEN, Irvington, New York. *Apparatus for decolourizing sugar liquor by upward filtration through bone-black.* October

27th, 1885. This relates to improvements on the machinery described in the foregoing five patents. It was found that the central portion of the said rotating, supporting and discharging instrumentality being solid, had no capacity for discharging the superincumbent bone-black in vertical alignment with it. The first part of this invention is designed to overcome this difficulty, and consists in the erection of a columnar shield above the central solid portion of the discharger, which shield extends upward through the mass of bone-black contained in the filtering chamber. As the solid rim of the discharger extends under the lower end of the wall of the filtering chamber and the cutting edges of the slots or openings in the discharger act upon the entire bottom of the column of bone-black between the central columnar shield and the wall of the filtering chamber, it follows that by this invention a vertical line drawn through any portion of the column of bone-black necessarily intersects at its lower end a part of the bottom stratum of bone-black, which is supported directly upon the discharger, and which is removed by the rotation of the discharger. The second part of the invention consists in the employment of a flat-bottomed receiving chamber of comparatively small height, and of a rotating scraper or plow which is arranged beneath the discharger, and which operates to sweep the exhausted bone-black and impurities which fall upon the floor of the receiving chamber into the mouth of a conduit, which conducts them to a depository, in connection with which suitable means are provided for finally removing them without interrupting the continuity of the filtering operation.

329210. E. E. QUIMBY, Orange, New Jersey. Assignor to the F. O. Matthiessen & Wiecher's sugar refining company, Jersey City, N. J. *Apparatus for decolorizing sugar liquor by upward filtration through bone-black.* October 27th, 1885. This invention is designed for the operation set forth in patents, Nos. 329329 to 329332. It consists in a filtering chamber for containing a solid column of bone-black of uniform area in cross-section from top to bottom, a supporting and discharging instrumentality for supporting said column hereafter described, outlets for the escape of the sugar liquor from the filtering chamber at a prescribed elevation above the said supporting and discharging instrumentality, means for supplying fresh bone-black at the top of the filtering chamber, a receiving chamber for receiving the exhausted bone-black and collected impurities discharged from the filtering chamber, means for removing the said exhausted bone-black and impurities from the said receiving chamber, and means for introducing into the receiving chamber sugar liquor, under sufficient pressure or head to enable it to make its way upward through the column of bone-black contained in the filtering chamber, and escape therefrom through the outlets aforesaid. The supporting and discharging instrumentality consists of a grate, the bars of which are set parallel to and are equi-distant from each

other, and have their upper portions inclined laterally and formed into cutting edges, terminating in a plane inclined in the direction opposite to the direction in which the upper portions of the grate bars are inclined.

329305. T. GAUNT, Cold Spring, New York. *Bone-black discharger for continuous filters.* October 27th, 1885. The invention consists in the provision, at the bottom of a filtering chamber in which the process of upward filtration is practised, of a movable horizontal diaphragm containing a series of openings, which may either be circular or slotted, and which is arranged immediately above a stationary horizontal diaphragm provided with a series of openings like those in the movable diaphragm. The bone-black or other filtering material removed from the bottom of the mass of filtering material in the filtering chamber by the operation of the moveable perforated diaphragm, falls into a receiving chamber or chambers beneath the filtering chamber, from which it is removed in any convenient way.

Patentees of Inventions connected with the production, manufacture, and refining of sugar will find *The Sugar Cane* the best medium for their advertisements.

The Sugar Cane has a wide circulation among planters in all sugar producing countries, as well as among refiners, merchants, commission agents, and brokers, interested in the trade, at home and abroad.

NEW YORK PRICES FOR SUGAR.

From Willett, Hamlin & Co.'s Report, October 15th, 1885.

FAIR REFINING.	96° CENTS.	GRANU- LATED.	STAND. A.	STOCK IN FOUR PORTS.
Nov. 12, 1885.—5 $\frac{3}{4}$ c.	6 c.	6 7-16- $\frac{1}{2}$ c.	6 3-16- $\frac{1}{2}$ c.	Jan. 1, 1885—89,186 tons.
Nov. 13, 1884.—5 c.	5 $\frac{1}{2}$ c.	6 $\frac{1}{2}$ c.	5 13-16c.	Jan. 1, 1884—60,900 tons.
Nov. 15, 1883.—6 $\frac{1}{2}$ c.	7 9-16c.	8 $\frac{1}{2}$ c.	7 $\frac{1}{2}$ c.	Jan. 1, 1883—50,297 tons.
Nov. 16, 1882.—7 $\frac{1}{2}$ c.	8 c.	8 $\frac{7}{8}$ c.	8 $\frac{1}{2}$ c.	Jan. 1, 1882—43,927 tons.
Nov. 17, 1881.—8 $\frac{1}{2}$ c.	8 13-16c.	9 11-16- $\frac{1}{2}$ c.	9 $\frac{1}{2}$ c.	Jan. 1, 1881—66,999 tons.
Nov. 11, 1880.—7 $\frac{1}{2}$ c.	8 $\frac{1}{2}$ c.	9 $\frac{1}{2}$ c.	8 $\frac{7}{8}$ -9c.	Jan. 1, 1880—63,558 tons.
Nov. 13, 1879.—9 c.	9 $\frac{1}{2}$ c.	11 c.	10 $\frac{1}{2}$ - $\frac{3}{4}$ c.	Jan. 1, 1879—50,773 tons.
Nov. 14, 1878.—71-16c.	7 $\frac{1}{2}$ c.	9 $\frac{1}{2}$ c.	8 $\frac{7}{8}$ -9c.	Jan. 1, 1878—48,230 tons.
Nov. 15, 1877.—7 $\frac{1}{2}$ c.	8 3-16c.	9 $\frac{1}{2}$ c.	9 $\frac{1}{4}$ - $\frac{1}{2}$ c.	Jan. 1, 1877—28,885 tons.

THE VISIBLE STOCKS AND FLOATING CARGOES,

According to the data given below, from the principal Countries, compared with the two preceding years, are as follows:—

	1885.	1884.	1883.
	Tons.	Tons.	Tons.
Germany..... 1st October	99,000 ..	59,875 ..	42,960
Austria 1st October	15,500 ..	41,400 ..	34,950
France..... 1st November ..	166,000 ..	161,850 ..	107,603
Holland 1st November ..	21,510 ..	10,576 ..	5,693
Belgium 1st October	46,850 ..	15,266 ..	2,870
Great Britain 14th November ..	253,626 ..	244,227 ..	205,805
Floating Cargoes.. 10th November ..	26,901 ..	30,831 ..	37,678
Total in Europe	629,387	564,025	437,559
United States 11th November ..	82,321 ..	102,125 ..	54,857
Havana and Ma-			
tanzas 23rd October	37,089 ..	46,443 ..	44,718
	748,797	712,593	537,144

As compared with a year ago, an excess is found at the following points:—In Great Britain, 9,000 tons; in Germany, 39,000 tons; in France, 4,000 tons; in Belgium, 32,000 tons; but there is a deficiency in the floating cargoes, in Austria, and in the United States, and on the stocks at the Cuban ports, which brings down the excess to about 36,000 tons.

PRODUCTION OF BEET SUGAR IN THE GERMAN EMPIRE,

FOR THE LAST 15 YEARS, IN TONS.

1884-85.. 1,154,817	1879-80.. 424,125	1874-75.. 250,708
1883-84.. 986,403	1878-79.. 420,684	1873-74.. 289,244
1882-83.. 848,124	1877-78.. 383,828	1872-73.. 258,666
1881-82.. 644,780	1876-77.. 291,204	1871-72.. 189,166
1880-81.. 594,223	1875-76.. 346,646	1870-71.. 262,987

PRODUCTION OF BEET SUGAR IN EUROPE,

FOR THE LAST 15 YEARS, IN TONS.

1884-85.. 2,539,456	1879-80.. 1,453,929	1874-75.. 1,184,048
1883-84.. 2,360,314	1878-79.. 1,624,153	1873-74.. 1,191,193
1882-83.. 2,147,034	1877-78.. 1,470,827	1872-73.. 1,211,945
1881-82.. 1,860,974	1876-77.. 1,101,141	1871-72.. 928,279
1880-81.. 1,774,545	1875-76.. 1,372,613	1870-71.. 942,588

IMPORTS (UNITED KINGDOM) OF RAW AND REFINED SUGARS.

JANUARY 1ST TO OCTOBER 31ST, 1885.

Board of Trade Returns.

RAW SUGARS.	QUANTITIES.		VALUE.	
	1884.	1885.	1884.	1885.
	Cwts.	Cwts.	£	£
Germany	5,081,173	6,086,189	3,863,886	3,809,700
Holland	189,265	226,908	149,407	158,499
Belgium	441,591	350,862	358,630	242,692
France	63,061	26,220	58,849	21,608
British West Indies & Guiana	2,899,194	2,405,551	2,736,258	1,926,563
British East Indies	1,003,014	692,669	593,673	361,623
China and Hong Kong	103,647	14,679	71,476	5,644
Mauritius	254,340	237,660	189,772	171,984
Spanish West India Islands	459,979	653,659	353,573	499,820
Brazil	1,242,329	1,167,643	951,035	703,688
Java	2,914,192	2,300,513	2,673,707	2,501,067
Philippine Islands	565,701	369,690	371,145	194,032
Peru	331,450	527,279	288,908	378,739
Other Countries	495,443	516,115	415,907	355,999
Total of Raw Sugars ..	16,044,379	16,575,637	13,076,226	11,331,658
Molasses	368,723	376,647	132,935	132,789
Total Raw Sugars ....	.....	.....	13,209,161	11,464,447
REFINED SUGARS.				
	Cwts.	Cwts.	£	£
Germany	523,108	659,080	551,425	557,810
Holland	695,550	1,089,946	1,183,935	1,000,839
Belgium	68,698	57,321	80,625	58,706
France	968,136	444,107	1,096,258	421,018
United States	900,454	2,006,701	921,953	1,814,770
Other Countries	22,420	2,425	25,447	2,032
Total of Refined	3,578,366	4,259,580	3,859,643	3,855,175
EXPORTS.				
	Cwts.	Cwts.	£	£
Denmark	181,147	109,754	153,249	85,143
Belgium	83,195	69,612	68,512	50,404
France	157,569	69,821	138,292	54,074
Portugal, Azores, & Madeira	80,816	67,837	67,870	50,891
Italy	202,258	235,644	173,180	173,999
British North America	72,710	17,370	58,411	11,739
Other Countries	325,278	264,838	311,443	205,369
	1,102,973	834,876	970,957	631,619

IMPORTS OF FOREIGN REFINED SUGAR.

The British Sugar Refiners' Committee furnish us with the following figures, giving the imports of foreign refined sugar for the month of October compared with the corresponding month of last year, and the average monthly imports for the year compared with those of 1883 and 1884, distinguishing the quantities of "Lumps and Leaves" from "other sorts," and giving the separate imports from each country:—

	"LUMPS AND LEAVES."						"OTHER SORTS," Including Crushed Loaf, Granulated, Crystallized, &c.						TOTAL.			
	Monthly Average.			Oct.,			Monthly Average.			Oct.,			Monthly Average.		Oct.,	
	1883.	1884.	1885.	Oct.,	1884.	1885.	1883.	1884.	1885.	Oct.,	1884.	1885.	1883.	1884.	1885.	Oct.,
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
	1883.	1884.	1885.	1883.	1884.	1885.	1883.	1884.	1885.	1883.	1884.	1885.	1883.	1884.	1885.	1883.
France	3538	2737	1739	658	1462	658	2477	1621	480	233	750	2219	6015	4358	891	2212
Holland,	2352	3580	4041	3505	3560	3560	1853	1948	1408	736	1652	5449	4205	5528	4241	5212
Germany & Austria	588	552	818	269	136	136	1854	2380	2476	1041	1838	3294	2442	2932	1310	1974
Belgium	319	183	179	55	191	191	124	151	108	81	222	287	443	334	136	413
United States	226	962	712	92	189	189	294	3386	9320	334	3318	10032	520	4348	426	3507
Other Countries ..	..	..	..	1	..	..	61	121	11	11	..	11	61	121	12	..
Total	7023	8014	7489	4580	5538	5538	6663	9607	13803	2436	7780	21292	13686	17621	7016	13318

SUGAR STATISTICS—GREAT BRITAIN.

TO NOVEMBER 21ST, 1885 AND 1884. IN THOUSANDS OF TONS, TO
THE NEAREST THOUSAND.

	STOCKS.		DELIVERIES.		IMPORTS.	
	1885.	1884.	1885.	1884.	1885.	1884.
London	84 ..	85	297 ..	320	291 ..	318
Liverpool ..	97 ..	111	250 ..	248	236 ..	282
Bristol	4 ..	5	43 ..	49	43 ..	49
Clyde	66 ..	42	217 ..	217	234 ..	198
Total ..	251	243	807	834	804	847
	Increase..	8	Decrease..	27	Decrease..	43

SUGAR STATISTICS—UNITED STATES.

(From Messrs. Willett & Hamlin's Circular, New York.)

FOR THE FOUR PRINCIPAL PORTS. IN THOUSANDS OF TONS, TO THE
NEAREST THOUSAND. FOR SEPTEMBER, 1885 AND 1884.

	STOCKS.		DELIVERIES.		IMPORTS.	
	Nov. 1st,		In Oct.,		In Oct.,	
	1885.	1884.	1885.	1884.	1885.	1884.
New York	58 ..	70	51 ..	68	40 ..	35
Boston	19 ..	22	12 ..	12	6 ..	6
Philadelphia	4 ..	6	9 ..	3	7 ..	2
Baltimore . . . . .	.. ..	..	.. ..	..	.. ..	..
Total	81	98	72	83	53	43
	Decrease..	17	Decrease..	11	Increase..	10
Total for the year	..	..	967	903	959	940

In the case of Baltimore, where nothing is put down, it means that the Stock, Imports, and Deliveries, do not exceed 500 tons in each case.

STOCKS OF SUGAR IN THE CHIEF MARKETS OF EUROPE ON THE
30TH SEPTEMBER, FOR THREE YEARS, IN THOUSANDS
OF TONS, TO THE NEAREST THOUSAND.

Great Britain.	France.	Holland	German Empire.	Austria.	Remaining four principal entrepôts.	TOTAL 1885.	TOTAL 1884.	TOTAL 1883.
293	155	25	99	16	23	611	514	342

CONSUMPTION OF SUGAR IN EUROPE FOR THREE YEARS, ENDING
30TH SEPTEMBER, IN THOUSANDS OF TONS, TO THE
NEAREST THOUSAND.

Great Britain.	France.	Holland	German Empire.	Austria.	Remaining four principal entrepôts.	TOTAL 1885.	TOTAL 1884.	TOTAL 1883.
1212	489	52	399	187	338	2677	2482	2417

ESTIMATED CROP OF BEET ROOT SUGAR ON THE CONTINENT OF EUROPE,
FOR THE PRESENT CAMPAIGN, COMPARED WITH THE ACTUAL CROPS,
OF THE THREE PREVIOUS CAMPAIGNS.

(From *Licht's Monthly Circular*.)

	1885-86.	1884-85.	1883-84.	1882-83.
	Tons.	Tons.	Tons.	Tons.
France.....	300,000	308,410	473,676	423,194
German Empire...	900,000	1,154,817	986,402	848,124
Austro-Hungary....	375,000	557,766	445,954	473,002
Russia and Poland..	400,000	380,000	307,697	284,991
Belgium.....	65,000	88,463	106,586	82,723
Holland and other Countries.....	35,000	50,000	40,000	35,000
Total.....	2,075,000	2,539,456	2,360,315	2,147,034

The only alterations in Mr. Licht's present estimate are, in France reduced by 75,000 tons, and in Austria, increased by 75,000. The general total remains as last month.

STATE AND PROSPECTS OF THE ENGLISH SUGAR MARKET.

Notwithstanding the excitement of the general election, which must have interfered with business, the market for raw sugars for the past month has been an upward one. Beet is 9d. per cwt., and cane kinds, with the exception of low East Indian, which remain the same, are 6d. per cwt. higher. The statistical position of sugar is a very strong one, and if the market was left to take its natural course, we should see much higher prices in the near future.

Our refiners have been seriously harassed by the heavy imports of American bounty-fed refined, during the first nine months of this year: the imports for October show a large falling off, but they are now threatened with enormous imports of Russian refined. It is stated that about 100,000 tons are awaiting the decision of the Russian Government, which, if favourable to the demands of the fabricants for a bounty grant, will be exported and for the time being will prevent any great advance in raws. Russian crystals are being quoted in London at 17s. 6d. c.i.f.

The stocks in the United Kingdom have been reduced during the month by some 25,000 tons. If we take the visible stocks and floating cargoes (see page 655), not including Russia, which has not hitherto been brought into the account, they show, as compared with a year ago, an excess of only about 36,000 tons.

The latest advices from the United States show a strong market, both for raws and refined.

The price of beet (88 % f.o.b.) is 14s. 9d. to 15s. per cwt. prompt, or 2s. below the highest point last May. West India kinds are 1s. 6d. per cwt. below. Low East India are about the same price.

On November 21st the deliveries in the United Kingdom show a decrease of 27,648 tons as compared with the same period in 1884, and the imports a decrease of 43,721 tons.

The imports of American refined for October were 426 tons, making a total for the ten months of 100,327 tons, against 45,100 for the corresponding ten months of 1884.

The stocks in the United Kingdom on the 21st November, were 250,711 tons, against 242,745 tons in 1884, and 205,905 tons in 1883.

Present quotations for the standard qualities, as under, are:—

FLOATING.		Last Month.
Porto Rico, fair to good Refining	14/6 to 15/- against	14/6 to 15/-.
Cuba Centrifugals, 96% polarization .. .	16/9 to 17/-	16/9 to 17/-.
Cuba Muscovados, fair to good Refining ..	14/6 to 15/-	14/6 to 15/-.
Bahia, middling to good Brown, No. 7 to 8½	13/- to 14/6	13/- to 14/-.
Pernambuco, good to fine Brown	14/- to 14/3	14/- to 14/3.
Java, No. 14 to 15	17/6 to 17/9	17/6 to 17/9.
LANDED.		Last Month.
Madras Cane Jaggery	11/3 to 11/6 against	11/3 to 11/6.
Manilla Cebu and Ilo Ilo	11/3 to 11/6	11/3 to 11/6.
Paris Loaves, f.o.b.	19/6	20/6
Titlers	20/9	21/-
Tate's Cubes	22/3	22/-
Austrian-German Beetroot, 88% f.o.b. ..	14/9 to 15/-	14/6

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